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THE AMERICAN JOURNAL OF PUBLIC HYGIENE

S. H. DURGIN, M.D. . . . . *Editor*
H. W. HILL, M.D. . . *Associate Editor*
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INDEX

TO THE

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VOLUME XVII

(A) is an abbreviation for Abstract.

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THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH was organized in Boston, March, 1890, with the following objects: The advancement of sanitary science; the promotion of better organization and co-operation among local boards of health, and the uniform enforcement of sanitary laws and regulations.

THE JOURNAL OF THIS ASSOCIATION has for sixteen years faithfully reflected the views of the public hygienists of Massachusetts. With the November issue of the year 1904, the encouragement received from many hygienic quarters induced the Association to undertake the expansion of the Journal to a national standard, with the co-operation of many noted sanitarians as editors. A new title was selected, while the older and well-established title was retained also.

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EDITORIALS.

THE ADVANCE OF SANITATION IN MEXICO.

It is a curious fact that the people of the United States have, until recent years, had but little knowledge of and sympathetic interest in their intimate neighbors in the south. They have looked upon Mexico especially as picturesque, but impossible to live in; a land of physical and social earthquakes.

They have rather suddenly awakened to the fact that such ideas are far from the truth. They are learning by experience the truth of that statement made so long ago by Cortez in his letter to his king, "that it is indeed a beautiful country and the character of the people most worthy of admiration."

If these things had been known in 1846, as they are now, that iniquitous war would never have been fought. No such invasion of Mexico would now be possible, but only that kind which was recently made by the American Public Health Association. This was an invited invasion where the only contest was as to the best methods of promoting public health, and the only fear on the part of the invaders lest they should break down under the load of benefits heaped upon them. There is this further difference between these invasions, that of '46 was a victory for the United States, while this of 1906 was clearly one for Mexico.

But it is for her relative rather than for her absolute sanitary accomplishment that Mexico deserves the victor's palm. The latter has been indeed large, but the former is simply phenomenal. Twenty-five years ago she was practically lacking in everything which modern science regards as necessary for public health, everything except a superb climate and men of willing minds. Cities were not sewered

nor supplied with pure water. Streets were not clean, nor properly paved. Food was not properly inspected. The result was an abnormally high death rate everywhere, and every foreigner especially, who went to one of the cities to live knew that he took a great health risk in doing so.

We do not by any means claim that sanitary conditions are now ideal in Mexico. In many parts we know the old conditions still exist to a considerable extent. But what we claim is, that Mexico has sanitarians of high rank, who recognize what needs to be done, and a government which promotes their work; and these are the two main factors of success in any public enterprise. Furthermore, when these two factors are represented by two such men as President Diaz and Dr. Edward Liceaga, the possibility of rapid accomplishment is greatly increased.

There has been none of the proverbial Spanish *manana* in the sanitary progress of Mexico for the last twenty-five years. It has been rapid, intelligent and solid. They began in the right way, by forming a central board called the Superior Board of Health, who took the initiative in organizing the work throughout the country. They also wisely decided that the capital city of the Republic, Mexico, should serve as an object lesson in sanitary matters, and so have obtained for it those excellent sewers, clean and well-paved streets, and supply of pure water, (the latter plant not yet completed), which they exhibited to their recent guests with such pardonable pride.

They have solved at enormous expense probably the hardest drainage problem that any city in the world has had. It is one of the wonders of modern engineering. The sewers connected with this, with their flushing arrangements, were thought worthy of a first prize by an international jury at our recent World's Fair. One hundred and twenty-five streets of the city of Mexico are paved with asphalt and kept scrupulously clean. The city has a steam disinfecting plant, and a municipal laboratory for food and

water analysis and examinations for infectious diseases. It has one of the largest and best free hospitals in the world, built and operated on the most sanitary lines. It has a penitentiary, a model of its kind, in everything pertaining to sanitation. It is constantly building school houses which are a delight to the hygienist, and its new public buildings are up to the same high stanitary standard.

This sanitary contagion has spread throughout the land so that there is not one of the chief cities of Mexico which has not completed already, or has projected, important sanitary improvements. This is especially true of the coast cities formerly such hot-beds of disease. Thus Vera Cruz finished a new water system in 1905, costing several hundreds of thousands of dollars, and in the same year a marine disinfecting and general sanitary plant, costing $500,000, and has a new sewer system well under way. The result is that yellow fever has been driven out from that city. Monterey finished a water and sewer system in 1903, costing $2,000,000, and Tampico did the same in 1904, though at less cost. Each city seems to be running a race with the capital city in sanitary improvements, because each city has the intelligent interest of the Superior Board of Health whose head is Dr. Liceaga, and in each is located some able physician, like Dr. Chico in Guanajuato, Dr. Brena in Zacatecas, and Dr. Iglesias in Vera Cruz, who are in thorough sympathy with the work.

As said above, there is very much that is unsanitary in Mexico, and they have a tremendous problem before them to impress hygienic principles upon their large, ignorant, tradition-bound poor element, but they are attacking the problem vigorously, and getting results worth a long journey to see. And the American Public Health Association which invited them to its membership about fifteen years ago may well take pride in and some credit to itself for their sanitary progress thus briefly outlined.

FRANKLIN C. ROBINSON.

THE MEXICO CITY MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

Dec. 3—7, 1906.

To those members who had visited Mexico City, 14 years ago on a similar errand, this meeting received many pleasant memories and also revealed many changes and contrasts. As the capital city is one of the four great countries united in the American Public Health Association, Mexico City presented peculiar claims on the Association as a meeting place, but its historical features, its climate, its architecture and above all its people, have far wider claims on more general grounds. Those members of the Association who visited it for the first time, while expecting to see an advanced civilization, were hardly prepared for the perfection in architecture, sanitation and hygiene shown in all of its new public buildings, schools, hospital and penitentiary, each a perfect model of its kind. The new postoffice challenges comparison, I think, with any building in the world, designed for a like purpose; it is most perfect in every detail, the interior furnishings and decorations consisting of artistically wrought bronze from Florence, Italy, and Mexico's own beautiful onyx, with the exquisite woods from which the furniture in the various offices were made, forming together a most harmonious whole. The development, system and modernity of life in Mexico City, flavored, it is true, with the peculiarities of the semi-tropics, is astounding. "Europe in America" was the dictum of one of the visitors, who could not but see that in shortcomings it only paralleled while in achievements it equalled and sometimes excelled the home cities of the visitors.

"Europe in America" may be particularized to "France in America." The relations between Mexico City and Paris have for many years been more intimate than with

Madrid or New York. It is to France that Mexicans have travelled for business as well as pleasure, for professional and post graduate study, for instruments and for inspiration. Spanish in language, customs and art, Gallic in thought and action, the Mexicans are interestingly composite. Those who believe France the most logical and clear-sighted of European peoples must admit that Mexico has chosen well and followed to advantage no mean mentor. Shrewdness without narrowness, thrift without meanness, patriotism, intelligent as it is intense, science reduced logically to practice—these are the results. But if Mexico, amongst Spanish surroundings, is French mentally, it is rapidly becoming American, physically—at least in manufactured articles. The street cars are made in St. Louis, "Mexican" spurs in New Jersey; expanded metal, cement mixers, shirts, harvesters—all are from the United States. But they are used with French shrewdness and *elan*

The meetings of the Association were arranged for by that quite remarkable leader in broad hygiene, Dr. Eduardo Liceaga, President of the Superior Board of Health, and were held in very comfortable quarters in the Conservatory of Music, close to the Municipal Palace, the President's Palace and to the Zocolo or park, at the head of San Francisco street. The meetings of the Section were held in a committee room of the Superior Board of Health on Santo Domingo square, not far from the Zocolo.

Matters of much technical importance to health officers were discussed but no adequate review could be made of these here. They will appear in due course in the transactions of the Association. The published program of the Association did not represent half of the papers presented, since notification of the Mexican contributions was not received until our arrival in Mexico. Of matters of more general interest perhaps the most important came up at the first meeting. Dr. P. H. Bryce, Medical Director of

the Canadian Immigration Bureau, presented a very striking address, the key note of which was the importance of sociologic study to the health officer. Sociology is perhaps the most pressing question of the times for all those having to do with government of any kind, and it is brought home acutely to those dealing with immigration. It also clamors loudly to the state and municipal health officer, but falls often on deaf ears—like the muck raker of Pilgrim's Progress, the health officer is usually so absorbed in the mere technicalities of his art, that he fails to appreciate wherein his efforts are part only of the gigantic whole of modern life—wherein his efforts may, if widened only a little, exercise untold effects upon the future. Dr. Bryce made it very forcibly obvious that the mere repetition day after day of the routine of notification, placarding, disinfection, etc., etc., can never place public hygiene in its proper place. These are the essential "manual of arms" —but no manual of arms ever won a victory in itself.

A happy provision resulted in the close proximity to Dr. Bryce's place on the program of two Mexican papers, calling for the enlargement of the powers of hygienists, the creation of a federal department of health in Mexico, and the necessity for large and broad co-ordination of public health activities. Incidentally one of these papers pointed out the seriousness of the lack of such central authority, in the case, specifically, of the San Francisco plague. Here occasion was taken to point out courteously but unmistakably the lack of a similar department in the United States, and that, in their efforts to prevent the entrance of plague into Mexico, the Mexican government could find, north of the boundary line "no adequate authority with which to deal." This arraignment of the United States was taken much to heart by the Association and a number of resolutions were presented, the one finally accepted by the Association being here reproduced.

"Whereas, The American Public Health Association is

of the opinion, and has heretofore so expressed itself, that public health matters confronting the four countries embraced in this association can only be adequately administered by extending the powers and duties of their several chief executive and administrative health officers, and

Whereas, This Association believes that such question can only be satisfactorily dealt with by the establishment of a national department of health with a cabinet minister at its head in each country.

Therefore, This Association, with a view to prosecute so desirable an end creates a committee consisting of three members from each of the four countries represented in the Association and to be nominated by the president, the first-named member for each country to be chairman of that sub-committee and the chairman of the sub-committee of the United States to be its general chairman. This committee shall formulate what in the opinion of the Association should be the extent of the work, powers and duties of a national department of health, and the sub-committee of any of the four countries shall take any steps deemed practical by it to carry out the purpose of this resolution, and to this end be empowered to enlarge its committee as it may deem proper."

Dr. John S. Fulton, in discussion, called attention to the recent address of Prof. Norton of Yale on this subject, to the endorsement of the American Association for the Advancement of Science which it received, and to the appointment of a committee of 100 to secure legislation. The striking feature of this movement is its advocacy by those outside of the ranks of the professional hygienist.

For the accessories of the meeting, the excursions provided by the Mexican Committee of Arrangements, under the guidance and stimulus of Dr. Eduardo Liceaga, nothing but the most grateful praise can be accorded. A reception by President Porfirio Diaz, giving an opportunity to see one of the intrinsically great rulers of the world, was per-

haps the most interesting of all. The Quarantine Station at Vera Cruz; the catacombs at Guanajuato; the new conduit and the proposed city water supply at Xochimilco; the hospital, built under Dr. Liceaga's control, and containing amongst other wonderfully progressive ideas, a regular primary school for convalescent of chronic cases amongst children; the personal examination of a considerable number of typhus cases afforded us by the courtesy of the hospital management; the inspection of the Research laboratory; the Bacteriological Routine Laboratory; the Chemical Laboratory, and the Pasteur Institute of the Superior Board of Health, to say nothing of receptions, concerts, etc., furnished material for the pleasantest reminiscences for many years to come. The only regrets associated with the trip were connected with the familiar faces and close friends who were not there. The sudden illness of Dr. William Bailey cast a gloom over the Association, which his courageous good temper and cheerfulness did much to lighten, and he was able to return with us, although as an invalid. While the high altitudes and sudden changes of temperature resulted in some minor complaints amongst the members, the visit to Mexico was singularly free of accident or disaster. H. W. HILL.

NOTE.—In recording the action of the American Public Health Association concerning federal departments of health in all four of the countries having membership in the Association, we wish to call particular attention to the meeting in Washington, Dec. 13-15, 1906, of the Conference on Medical Legislation and the National Legislative Council of the American Medical Association, reported in the Journal of the American Medical Association, Jan. 12, 1907, p. 152. Dr. A. S. Barchfeld, (M. C. 32 Penn. Dist.), there presented a bill for the creation of a Federal Department of Health, and invited criticisms and suggestions. Our readers should make a point of studying this bill.

JANUARY QUARTERLY MEETING
OF THE
Massachusetts Association of Boards of Health.

The annual (and quarterly) meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, January 24, 1907. Dr. Henry P. Walcott presided, and there was a large attendance of members.

THE PRESIDENT: Mr. Coffey, the active Secretary of the Association, is unfortunately detained in Worcester by business. Therefore it will be necessary to make a *pro tempore* appointment to that office. Dr. Palmer nominates Mr. Rickards of Boston. Is it your pleasure that he serve you in that capacity?

(Mr. Rickards was elected Secretary *pro tem.*)

THE PRESIDENT: As Mr. Rickards has no records to read, there will be no delay.

The next business on your program is the election of officers for the ensuing year. What action will you take?

DR. MARION: I move that a committee of three be appointed by the Chair to nominate officers for the ensuing year.

(The motion was seconded by Dr. Worcester and adopted).

THE PRESIDENT: I will appoint as members of that committee, then, Dr. Marion of Boston, Dr. Tobey of Clinton, and Mr. Newcomb of Salem.

The Executive Committee have approved the applications for membership of

Dr. John H. Nichols, Superintendent State Hospital, Tewksbury.

Louis A. Olney, of the Lowell Textile School, Lowell.

Dr. Burdett Arms, Assistant Bacteriologist, Boston Board of Health.

Dr. George A. Sargent, of the Boston Board of Health.

What action will you take with regard to these nominations?

(The four gentlemen named were elected members of the Association).

THE PRESIDENT: While your Nominating Committee is absent I presume there is no objection to going on with the program of the afternoon. If so, I will call upon the reader of the first paper, Dr. J. W. Proctor.

LEPROSY IN MASSACHUSETTS—ITS DIAGNOSIS AND SEGREGATION.

Illustrated by Stereopticon Views.

By J. W. Proctor, M. D.,

State Board of Charities.

Mr. President and Gentlemen: I want to change the order of parts of the paper and place leprosy in Massachusetts last, dealing first in a very brief way with the symptoms of the disease.

For convenience of description, leprosy is divided into three forms: the tubercular, the anaesthetic and the macular forms.

I will very briefly give the sequence of symptoms of each form.

Tubercular Form:—The first symptom of the tubercular form is the appearance of irregular, pale red, or dark brown pigmented spots, varying from one-fourth to several inches in diameter, smooth and glistening. These are seen chiefly on the back, face, and extensor surface of the extremities. Sooner or later these spots increase in size, become raised above the level of the adjacent skin, and nodules or tubercles form. The tubercles are the size of a bean to that of a

walnut, or larger. These are most abundant on the forehead, cheeks, lips, nose, beard, ears and eyelids. The cheeks become pendulous, eyebrows and beard fall out; hands and feet become swollen and covered with tubercles, and later on the lymphatics are involved. There is often a period of quiescence followed by the formation of a new crop of tubercles while the old ones ulcerate. Ulceration extends to the neighboring skin and deeper tissues. Next the mucous membranes are involved, iregular attacks of fever occur, showing involvement of internal organs. Finally mental symptoms manifest themselves. The patient becomes listless and helpless, he has no desire for food, diarrhoea sets in and he dies of inanition.

Anaesthetic Form:—In this form the first thing noticed is a crop of bullae containing a yellowish serum. These bullae break after a few days and leave a white, pigmented scar. Other crops appear and disappear. Sooner or later these white spots become tender and painful. This condition lasts for months. Finally anaesthisia succeeds hyperaesthesia and the patient often thinks that he is getting well. This anaesthesia finally involves large areas of skin and then extends into the deeper tissues. The subcutaneous fat disappears, theskin becomes dry and wrinkled, sweat glands destroyed, the hair falls out over the affected areas, muscles atrophy, hands and toes become contracted. Pressure on bony prominences causes ulceration and joints to open, fingers, or toes, or even a whole hand or foot may drop off. Mucous membranes are involved and leprous fever manifests itself as in the tubercular form. Finally the patient becomes dull and stupid, remaining motionless for days at a time. He gradually wastes away until relieved by death. The immediate cause of death is usually inability to take sufficient nourishment to prolong life.

Macular Leprosy.—This variety of leprosy usually has indefinite prodromal symptoms, after which the macules make their appearance upon the skin. They vary in color

from red to brown, and in rare cases may be white and glistening. After a variable length of time one of the other two forms of leprosy appears, and the case becomes either a tubercular or an anaesthetic one.

Differential Diagnosis.—The clinical features of a case of leprosy, typical in its development and advanced in its evolution, are so striking that it is impossible to confound it with any other disease. But in the early stages and even in fully developed cases with typical manifestations, there is no disease more difficult of recognition. In reading over the reports of cases examined by the Government Board of Physicians at Honolulu and various other places, I was surprised to see the large number of suspect cases reported, showing that even with these men, specialists in leprosy, it is oftentimes impossible, even for them, to make a positive diagnosis.

The diseases with which leprosy is most liable to be confounded are certain eruptions of the erythematous type, various pigmentary affections of the skin, more especially those of parasitic origin, as chromophytosis, tropical ringworm, vitiligo-morphoea, syphilis, cutaneous tuberculosis and certain diseases of the nervous system.

The prodromal symptoms which precede the eruptive stage of the tubercular form possess but little value. The attacks of fever followed by profuse perspiration are frequently taken for malaria. Their significance is seldom recognized until objective signs of the disease are manifest, and then these prodromal symptoms are of course valuable as a retrospective aid in the diagnosis. The sensory disorders, which form so valuable an element in the diagnosis of anaesthetic leprosy fail in the tubercular form, and their presence or absence may be disregarded.

The macular lesions often simulate ordinary erythema. They are distinguished by their localization, larger size, absence of desquamation, tendency to become nodular, and their slower changes of involution.

Syphilis presents many clinical analogies with leprosy, especially in its mode of involution. The roseola of syphilis corresponds to the erythema of leprosy, syphilitic pigmentation to the pigment spots of leprosy, syphilitic alopecia to the alopecia of leprosy, papules and tubercles of syphilis to the nodules of leprosy. In both the neoplasm follow a similar course of involution, they may undergo resorption, or they may soften and suppurate and disappear by a process of ulceration.

The erythematous syphilide may be differentiated from the leprous erythema by the smaller size and fainter colorization of the lesions, their absence from the face and limitation to parts habitually covered by the clothing, and their more rapid disappearance. The erythematous patches of leprosy are larger, more diffuse and more permanent.

It is, however, the tubercular form of syphilis which bears the most deceptive resemblance to leprosy. The syphilitic nodules are more circular in outline, more reddish brown or coppery in the cold, more apt to be grouped in circular and crescentic forms and more rapid in involution. The ulcerations of syphilis are more rounded, less circumscribed in extent, the crusts are thicker, harder, and of a brownish, blackish, or greenish tint. Leprous ulcers progress more slowly than those of syphilis, and they do not present a serpent-like mode of extension. The large superficial infiltrations of leprosy are not seen in syphilis. Leprous neoplasms are larger in volume, more protuberant and croned upon an infiltrated base with more or less oedema of the skin. Their seats of predilection are the face, lobes of the ear, backs of the hands and forearms, more rarely disseminated, while the nodules in syphilis are indiscriminate in their location, and may come where leprous tubercles rarely or never appear. The enormous nodular masses, the deep orbital and supra-orbital furrows, the pillowy-like protuberances of the cheeks with loss of eye-brows, are never seen in syphilis.

Syphilitic infiltrations of the mucous membranes also bear a deceptive resemblance to those of leprosy; they effect the same structures and are followed by the same extensive destruction of the tissues. The breaking down of the osseous framework of the nose, resulting in the broadening, flattening, and sinking in of this organ, is more common in leprosy. The harsh, croaking voice of leprosy, the difficulties of swallowing, respiration, the peculiar, foul odor exhaled, serve to distinguish it from syphilis.

The alopecia of leprosy differs from that of syphilis in that the scalp is not affected, while in leprosy the hairs of the eyebrows, eyelashes and beard only disappear.

Lupus vulgaris may be mistaken for leprosy, especially when the lesions consist of small, reddish-brown tubercles, grouped upon an infiltrated base and localized upon the cheeks or face. The frequent involvement of the lobe of the ear heightens the similitude. The infiltrations of lupus are more circumscribed in extent, limited in their localization, and not accompanied by anaesthesia.

Mycosis Fungoides.—Leprosy is characterized by and eruption of congestive spots or patches, which may appear and recede a number of times before becoming permanent. The erythematous patches of fungoides present a lighter or deeper red coloration; they are quite perceptibly elevated, with a more regular and distinctly circular contour, often surrounding islets of perfectly healthy skin. The macules of leprosy do not present the desquamating surface, nor the pointed, mammillated elevation of mycosis fungoides. When the fungating stage of mycosis is reached and the tumors soften and suppurate, the two diseases may be readily differentiated.

Fortunately, in case of tubercular leprosy a positive element of diagnosis is furnished by a microscopic examination. The bacillus of leprosy is invariably present in the leprous tissue and in no other.

The bacillus of leprosy was first observed by Hansen in

1871. It is stained more readily and decolorized more readily than the bacillus of tuberculosis. It has never been grown on artificial media, and is found in the blood only just before death. The best place to find the leprosy bacilli is in the anterior nasal cavities. It has been found there in 55 out of 57 cases of the tubercular form; 45 out of 68 cases of the anaesthetic form, and 27 out of 28 mixed cases.

Differential Diagnosis of Anaesthetic Leprosy.—In this form the spots may be a yellowish or fawn color, resembling chromophytosis; they are distinguished by the absence of scaliness and the parasite peculiar to this disease.

Vitiligo.—The patches of vitiligo are irregular in shape. dead white, margin convex and pigmented and clearly defined against the surrounding borders of healthy skin; the hairs of the leucodermic surface are often white, the skin normal, unaltered in structure or sensibility. In leprous leucoderma the spots are greyish white, and not so sharply defined. The skin is altered in structure, atrophia, depressed, often completely anaesthetic. The hairs of the affected parts fall out, sooner or later.

Morphoea and Scleroderma are distinguished by their waxy-white, lardaceous appearance, a hard, unyielding consistance, and a lilac border.

Syringomyelia.—The attacks of fever seen in leprosy do not occur in Syringomyelia. The muscular atrophy in leprosy appears first in the hands and feet, while in syringomyelia the proximal parts of the limbs are first involved. The symptoms characteristic of leprosy appear in no regular order. In syringomyelia the sequence of symptoms depends upon the seat of the disease in the spinal cord. When, as in most cases, the cervical or dorsal region is affected, then the upper extremities will be first attacked, the lower may escape for years and conversely. Leprosy attacks chiefly the small muscles of the hands and feet more seldom those of the fore arm and legs until later on.

It has been observed that where more than one mem-

ber of a family is afflicted they all have the same type of the disease.

Modes of Infection.—It is a question whether the virulent principle of leprosy may find entrance to the organism through cracks, fissures or abrasions of the integument. The fact that the first appearance of leprosy is commonly on the exposed parts, such as the face and extremities, and that in countries where the natives go barefoot, the plantar ulcer is often the earliest lesion, lends support to this view.

In leprous communities sexual intercourse is accepted by the laity and some of the profession as the mode of contagion, but the fact that the spermatic fluid is free of the bacilli and that the female organs of generation are notably exempt from leprous manifestations, would render improbable this mode of infection.

Mosquitoes gorged with blood which were found inside the mosquito nets of beds containing severe cases of leprosy were found to be free of the bacilli.

Infection by inhalation rests upon presumptive rather than positive proof. The sputum of leprous patients, which has been shown to be loaded with bacilli, disseminated through the air through particles of dust, may serve as a means of transportation of contagion.

Hutchinson advocated the fish theory as the cause of leprosy. The fallacy of the fish theory is shown by the fact that leprosy occurs among people who have never tasted fish, either through inability to obtain it, or because its use was forbidden by their religion.

Almost every article of food has in its turn been incriminated as an etiological factor.

There is not one exclusive mode of infection in leprosy, but it is probable that, like the bacillus of anthrax and of tuberculosis the mode of entrance of the parasite into the system is not single but multiple.

Race.—No race is immune to leprosy. There are racial peculiarities. It seems as if the black and yellow races are

the most susceptible. The white race shows a certain amount of immunity.

Climate.—Leprosy is not as prevalent in temperate and dry climates. It has not spread in our Northwestern States. Not a single native of the Northwestern States has acquired leprosy since it has been present there. As a rule, a hot moist or a cold moist climate favors the development of the disease. It has spread some in Louisiana.

Heredity.—The theory of heredity is an exploded one. No child was ever born with leprosy. There is no doubt but that a child born of a leprous parent or parents inherits a predisposition the same as a child born of tuberculous parents. Lepers are usually sterile. There were only five children born in the leper colony at Molakai during the first ten years after its establishment, although no restrictions were placed upon the intermarriage of lepers. If leprous women become pregnant they are apt to abort, or the child is stillborn, or very delicate. This is more pronounced if both parents are lepers.

Treatment.—The successful treatment of leprosy so far as a cure is concerned has been a dismal failure. Almost every drug has been tried at different times, and administered in different ways, but the most that can be said is that the treatment is only palliative.

Leprolin.—The treatment of leprosy by injection of leprolin is mentioned only to be condemned. The results have been disappointing to those using it, and its action is positively pernicious, in setting the bacilli free in the tissues and determining the development of new foci of the disease.

The so-called leprolin of Rost purports to be, like tuberculin, the filtered, germ-free fluid in which the specific bacilli have been cultivated, concentrated by evaporation and to which glycerin has been added for the purpose of preservation. The active principle of such a preparation is the toxins of the specific bacilli which have diffused into the culture medium during their growth.

All attempts however by bacteriologists to cultivate the bacillus of leprosy on artificial culture media has failed. Rost's attempts are, first of all, based upon a hypothesis which has no scientific foundation and his claim of having successfully cultivated the bacillus is wholly discredited by bacteriologists.

The treatment of such chronic diseases as tuberculosis and leprosy with the soluble toxins of the specific bacilli is most reasonably based on the theory that the toxins immunize the body ahead of the slow, chronic disease. But our knowledge of the failure to secure an effective immunity with the toxins of the tubercle bacillus under any condition and the notable failure of tuberculin as a curative agent in tuberculosis, makes the value of leprolin, if it could be produced, extremely doubtful. Rost's cultures were probably not leprosy bacilli and the reactions to injections of his preparation were probably due to proteids or other substances in the culture fluids, which, in the case of tuberculosis, will sometimes give the tuberculin reaction in animals susceptible to that disease.

Contagion.—There is quite a diversity of opinion in regard to the contagiousness of leprosy. On the one hand you will hear that it may be contracted by coming in contact with a case once or twice only, and on the other hand you will hear that it is almost the hardest disease to acquire. Those of the latter view will cite the case of the washerwoman at Molakai. They will say that husbands who have leprous wives and vice versa do not contract the disease in any larger proportion than among the community at large, that women have conceived and borne children by a leprous husband, and these children have leprosy, and yet the wife and mother escapes and, as afterwards observed, she has borne healthy children by a healthy man. Food cooked by lepers and eaten by non-lepers has many times failed to reproduce the disease.

But I hold the opinion that every one is not susceptible

to the disease. Did everybody who ever came in contact with our so-called contagious diseases, such as scarlet fever, small-pox, etc., contract each of them respectively, it certainly would be a dismal prospect for physicians and nurses.

When you hear of such cases as these just alluded to, they must be decided as cases possessing a personal immunity and the contagiousness of this or any other disease cannot be determined by these comparatively few cases.

Now when I stated that the white race showed a certain amount of immunity to this disease, do not misunderstand me. I was speaking of racial peculiarities.

There are many hundreds, if not thousands, of white people in Massachusetts today susceptible to this disease, if they should be exposed to it for any considerable length of time, and the thousands of our population who have colored and yellow blood in them must be more seriously considered.

A new source of contagion that must be taken into consideration is our recent annexations, Porto Rico and the Philippines. These places alone have added seventy to eighty thousand lepers to our population. With the invasion of these territories by our troops, mingling among unrecognized cases of leprosy, surely sooner or later, we will have cases here contracted in these places, where it is so prevalent.*

Through commercial zeal and enterprise, in the future a much closer and intimate relation will be held between us and these places where leprosy is so prevalent, and this, no doubt, will cause trouble for us.

Prophylaxis.—Observation shows that if a leper lives by himself, with separate rooms, bed, board, etc., and does not come into intimate contact with others, he is practically innocuous so far as contagion is concerned. But all lepers would not be willing to live peaceably by themselves. One

* Since this paper was read a case coming from the British West Indies has been discovered in Boston.

of our Massachusetts lepers would today run away and roam all over the world if he could obtain the chance, and so you see that in order to let a leper live near any cilivized community, with the privilege of having his own little farm and remaining on it, said leper must possess and exercise strong self-control, and keep by himself.

In cases where such a condition cannot be complied with they should be placed in a hospital specially provided for this class of patients.

All the secreta from the nasal passages should be collected and destroyed, also all the sputum expectorated should be collected in sputum cups and destroyed, also all dressings from sores.

There are, no doubt, several cases of leprosy in Massachusetts today unrecognized. If the physicians would only post themselves on this subject, recognize and report the cases early, this, together with the law compelling isolation, will make it comparatively easy to keep leprosy reduced to a minimum.

Leprosy is with us, and it is here to stay. Physicians must recognize this, and also that we are exposed to leprous communities today more than ever before.

Leprosy in Massachusetts.—The earliest case of leprosy in Massachusetts that I have been able to learn about was about thirty years ago. This patient was at Gallop's Island, and died there. Dr. Durgin of the Boston Board of Health found another case in East Boston several years after that.

In 1880 there was another case, one Charles Wilson, 30 years of age, single, born in Cuba. He was under observation from September, 1880, until August 27, 1884. He had the anaesthetic form and complained mostly of the plantar ulcer which he had, and was operated upon several times for this. He was in the Massachusetts General Hospital once only to my knowledge, and there he had his foot amputated. He left the state in 1884, and I know not whatever became of him.

The next case was a C. D. Derby of Salem. This man was born in Salem, but went to the Sandwich Islands when a young man. He remained there in the islands thirty years. He was quite an intelligent man, excelled in botany, and because of this knowledge he was gardener to the Queen for years, and no doubt had many lepers as helpers. He stated that he first noticed the brown spots about eight years prior to his leaving the islands for home. He was told that he had leprosy and that if he remained there he would be sent to Molakai. He started for Salem, his native place, and before he reached there it was known in Salem that he was coming, and the nature of his disease. He went to his sister's house and remained there one night and was carried to the Salem almshouse the next day. He had the tubercular form, one eye was destroyed, and the other involved to a certain extent. His case was reported Dec. 11, 1882. He was cared for at the almshouse in an attic room. The Salem authorities tried every means to have him taken at Tracadie and other places, and finally had to give it up. They decided to build a small house for him just outside of the almshouse, and did so, but he died about a week before it was completed, and the building stands there today.

In 1900 the Baker case was reported. Baker was a colored man, and had the tubercular form. He was placed on Gallops Island, remained there for a while, but finally escaped.

Three years ago there was not a known case of leprosy in Massachusetts, but inside of a period of one year and two days, five cases were reported, four of the tubercular type and one of the anaesthetic form, all cases being contracted abroad.

As none of these cases had legal settlement in any city or town of this Commonwealth, it became incumbent upon the State Board of Charity to take care of them. The State Board made every effort possible to have them trans-

ferred to some of the different leprosariums, but permission was denied from all of them. The various Boards of Health did not want to keep these cases permanently, and it was incumbent upon the State Board to buy a place and establish a leprosarium. Many places were considered, and finally Penikese Island was taken.

Present Massachusetts Cases.—Frank Pena.—The Pena case was reported April 22, 1904. He was then 37 years of age, married, born Cape de Verde Islands. He has been in the United States and Massachusetts for about twelve years, the past nine years in Harwich. He had a wife and eight children, the youngest of which was three months old when I first saw him. All were apparently healthy, and are, to my knowledge, so today. He first noticed the brown spots about eleven years ago. These have increased in size and number ever since, the tubercular masses the same. He has had several ulcers on his arms at different times, which have healed up readily, only to break out again and again. He has an extensive ulceration of the mucous membranes of his nose, throat and mouth. He has the croaking voice, and eyebrows and beard are gone, and there is extensive ulceration of the nose. In face, during the night that I drove him about fifty miles in a carriage on his way to Penikese his nose was bleeding nearly all night long. He is of a good disposition, and I think realizes what he has, but, like consumptives, still hopes that he will get well. Leprolin was used upon him, but the tubercles have become more prominent. He was treated by a number of physicians in several of our cities and towns, but his case was not recognized until it was diagnosed by a physician in a country town down on the cape who had never seen a case before, and to whom a good deal of credit is therefore due. Pena's physical condition today is very good.

Goon S. Dub. was reported on June 7, 1904. He was then 23 years of age. He has several tubercles on his face and

a few scattering ones on his body. He has several pigmented areas, and has had at various times an attack of what was probably leprous fever. Twice I have seen him when there was an erysipelatous inflammation around the nodules, and at these times the nodules were very prominent. Although the disease is not very extensive, he is not strong, and soon tires on exercising.

The John Roderick case was reported Oct. 7, 1904. He was born on the Cape De Verde Islands, and being a sailor, came to the Marine Hospital in Chelsea. He has been coming to this coast for the past thirteen years, off and on. He states that he noticed the first symptoms about nine years ago, when he "broke out in spots." Two years afterwards his face peeled, and ever since then the tubercles have been growing. He had extensive ulcers on each leg. also attacks of conjunctivitis, and the same croaking voice and muscular lesions. All the members of his family of eight have died or are suffering from this disease, with one exception. Pena and Roderick knew one another years ago when they were on the Cape Verde Islands, but had not met since, until the day the lepers were transported to Penikese.

Yee Toy was reported Jan. 18, 1905, is 25 years of age, and was born in China. This man's case is practically the same as that of the other Chinaman whom I have described, except that he is stronger. He has been in the United States for five years.

Isabelle Barros, reported April 24, 1905, is 27 years of age, born at the Cape de Verde Islands, is married and has two children, the oldest about three years of age. Both children are healthy. She has been in this country about four years. Through an interpreter I learned that her father probably died of leprosy. She gave a history of having had irregular attacks of chills and fever and of suffering for a considerable length of time from rheumatism. In fact, only a short time before I saw her she had been to a

hospital in one of our cities for rheumatism, and it was there that her case was first thought to be an incipient case of leprosy. I visited her weekly from April 24 until Nov. 16, 1905. At first she was quite weak, and presented several white patches, irregular in size and shape, especially upon her arms and legs. Although I found none that seemed to be anaesthetic, several places were hyperaesthetic. The muscles of the arms and legs were atrophied, especially those of the hands. There was a slight ptosis of the left side of the face, a small elevated pigmented area on the chin and a small tubercle on the ear. There was complete ulceration of the septum, she had the leprous coryza, and in smears taken from the nasal cavities hundreds of the bacilli of leprosy were found. As time went on she developed a small plantar ulcer which healed up two or three times and broke down again. In August she commenced to complain that she was losing the feeling in her left hand, and that it was numb all the time. This symptom still continues.

Charles Beals is 54 years of age, was born in New Orleans and is married. This man has had diseases of childhood, and had yellow fever 35 years ago. About five years ago patient noticed enlargements in his arms. He states that he has had slight chills off and on for the past two or three years, and more or less lassitude. He has a plantar ulcer on each foot; the first phalanx of the great toe on the left foot has entirely disappeared with retraction of the toe on the dorsum. There is also an ulcer of the same toe. About a year ago he had to give up work. The circulation of the extremities is very poor, the feet turning almost black upon standing; sensation is slightly impaired; fingers of both hands are dactylitic; there is a complete ulceration of the nasal septum; extensive ulceration of the soft palate; slight alopecia of the outer margin of each eyebrow; numerous nodules, propably of lymphatic glands, in both legs and arms; skin of hands appears smooth and shiny; disease is

more marked on left side than on the right. I took several smears from the anterior nares and throat; also, with cocaine, carefully dissected one of the glands on left forearm; microscopical examination shows the presence of many lepra bacilli. He has the characteristic harsh, croaking voice. The man has been a railroad messenger for the Adams Express Company for a number of years, and says that if he has contracted any bad disease, he lays it to the handling of packages of foreign money, which, he says, have been, in very many instances, not only exceedingly dirty, but very foul smelling.

The cottages where the lepers are now living are 36 feet long by 27 wide. Each contains four rooms, a general sitting room, two bed rooms, a kitchen, pantry, closets, and a bath room with open plumbing. They are situated on the westerly side of the island, with a good view of the ocean, and well protected by the natural conformation of island from the prevailing winds and storms of winter.

Upon an elevation between the cottages and the administration building has been built a reservoir, with a capacity of 10,000 gallons, into which water of a good quality is pumped. This water supplies the various buildings, and has sufficient pressure to answer all needs in case of fire. There is also a complete sewage system connecting all the buildings and running well out into the ocean.

The two Portuguese patients occupy one cottage, the two Chinamen another. The Barros woman with her attendant another, and the fourth is occupied by a male attendant.

THE PRESIDENT: Dr. Proctor's paper is now before you for discussion.

DR. DURGIN: I move a vote of thanks of the Association to Dr. Proctor for his interesting paper.

(The motion was seconded by several members and carried by a vote of the Association).

THE PRESIDENT: The next paper is one upon Rabies in Massachusetts, by Dr. Peters.

RABIES IN MASSACHUSETTS.

Symptoms, Importance of Early Diagnosis, and Practical Methods for its Suppression.

By Austin Peters, M.R.C.V.S.,
Chief of the Cattle Bureau of the Massachusetts State Board of Agriculture.

Mr. Chairman and Gentlemen:—

I have been requested to make some remarks at this meeting upon rabies in Massachusetts because the continuance of the outbreak which started in 1905, and the increased prevalence of the disease during the present winter, has kept up the public interest in this dangerous and troublesome malady, and makes it of special interest just now to sanitary authorities.

The word rabies is derived from the Latin *rabies.* The disease has been known from the earliest antiquity, and has been mentioned in the writings of the oldest authorities upon matters connected with medicine.

Aristotle describes it in the fourth century, B. C., who writes: "Dogs suffer from madness which puts them in a state of fury, and all the animals that they bite, when in this condition become also attacked by rabies." Allusions are made to it in the works of Virgil, Horace, Ovid and Plutarch. Aurelius Cornelius Celsius, a celebrated physician, was the first to describe human rabies and to employ the term "Hydro-phobia." It has been stated that rabies has existed in England from time immemorial, until within the last three or four years.

Rabies must have been quite prevalent in London in the middle of the eighteenth century to have inspired Oliver Goldsmith to write his Elegy on the Death of a Mad Dog:—

"Good people all, of every sort,
Give ear unto my song,
And if you find it wondrous short,
It can not hold you long.

In Islington there lived a man,
Of Whom the World might say,
That still a Godly race he ran,
When e'er he went to pray.

A kind and gentle heart he had,
To comfort friends and foes;
The naked every day he clad,
When he put on his clothes.

And in that town a dog was found;
As many dogs there be—
Both mongrel, puppy, whelp, and hound,
And curs of low degree.

The man and dog at first were friends;
But, when a pique began,
The dog to gain some private ends,
Went mad and bit the man.

Around from all the neighboring streets
The wondering neighbors ran;
And swore the dog had lost his wits,
To bite so good a man.

The wound it seemed both sore and sad
To every Christian eye;
And while they swore the dog was mad,
They swore the man would die.

But soon a wonder came to light,
That showed the rogues they lied—
The man recovered of the bite;
The dog it was that died."

Whether or not Oliver Goldsmith foresaw that some day a means for preventing hydrophobia would be discovered we do not know; as a young man he studied medicine, but it is not thought that he knew very much about it.

When rabies was first imported into North America is not known, but the following clipping from the Providence Journal which appeared in its columns during the latter part of August appears to indicate that it occurred here more than one hundred years ago:—

"The following extract from the Boston Gazette, of Feb. 12, 1797, has been sent to the Journal by a correspondent in Washington who has been reading the recent stories about mad dog scares in various parts of Rhode Island:

"Mad Dogs."

"On the 22nd ult. there appeared in Providence Neck a strange Dog, which fought with another till beaten off; after this as a man was riding his horse to water through a foot path, he met the first mentioned dog, which bit the horse near the breast. The dog went thence about a mile, and entered a barn by a window. The owner afterward going in was bit on the knee. He pursued the dog, accompanied by some neighbors, and found him engaged with a black woman, who defended herself with a tub she had in her hands. Being drove off he ran to a neighboring house, and crawled under the lintel, where he was shot.

"Happy for the person bitten he had on thick breeches, drawers, and stockings, but it is hoped that the linen and the woolen, through which his teeth passed, so far cleansed them as to prevent the flavor communicating; the person is however so much alarmed, as to have applied to several physicians for directions to prevent the dreadful effects which often ensue, and is pursuing the remedies pointed out. The dog which fought with the mad one was much bitten and is secured. In Freetown, Swansey, and Bristol,

several animals have been bitten by dogs supposed mad, and a child in the country northward is said to have died not long since from the bite of a mad dog. There being many more of these animals in Providence than are usual some further regulations seem necessary for the preservation of our citizens."

"No specific remedy has yet been published for the hydrophobia after it appears. It is recommended as soon as a person is bitten, to wash the part freely, and either cut out a piece of flesh, or dilate the orifice so as to make it bleed freely, washing off the blood for the same time, and then to keep open the wound by suitable dressings for a length of time, as no pains should be spared to prevent the poison being absorbed, this being to present almost the only hope of safety. Many in times past have been bitten and not affected; but when the affection has been so great as to occasion a dread of water, it is presumed none have recovered."

"Since the above was penned the writer was informed of a man at India Point having been bitten in the hand by a strange dog, possibly the one above mentioned. A cow bitten in the street about six weeks since by a strange dog, ran mad last week, and has been killed. One or more dogs have been killed in town, on showing symptoms of madness. A bitch that attacked her pups, killed some and wounded others, was immediately shot. Great care and caution are recommended."

The present outbreak seems to be simply a case of history repeating itself, similar epizootics occur every eighteen or twenty years, and although the present one may seem to be more extensive than any previous one it must be remembered that our population has increased amazingly, and with the increase in the canine population has kept pace, furthermore a better and more complete record of the cases has been kept during this outbreak than in any other heretofore.

Prior to the present outbreak Massachusetts appears to have been practically exempt from rabies for several years. There was not a single authentic case reported to the Cattle Bureau from September, 1903, to November, 1904, when a case was reported in a dog owned in Somerville, and in December a case was reported in Milton. Since then a number of serious outbreaks have occurred in various parts of the state. While it was quite prevalent in 1905 it has increased alarmingly in 1906.

During 1905 there were 98 cases in dogs, five in cattle and one in a pig, two persons died in Lowell after returning home from New York where they had taken the preventive treatment.

In 1906 for eleven months ending Dec. 1, 288 cases occurred in dogs outside of Boston, 38 in cattle, 6 in horses. In Boston the veterinarian of the Boston Board of Health states that there were 38 cases in dogs. A dog quarantined in 1905 also died of this disease after Jan. 1, 1906, making a total of 327 dogs to have rabies in the eleven months ending Dec. 1st in Boston and Massachusetts. Since the first of December this malady has been fully as prevalent and troublesome as it was before that date.

One hundred and ten dogs have been proved to be rabid in 1906 by Dr. Frothingham's examination, also seven cows, two horses and a boy. The other dogs outside of Boston reported as rabid were clear cases, most of them having a history of a bite from a rabid dog, and the cases diagnosed by agents of the Cattle Bureau.

Beside the animals reported there have been seven human deaths from this disease. The history in most of the cases has been that the victims were bitten by stray dogs, which they did not know to be rabid, and developed symptoms later and died without realizing that it was necessary to take the Pasteur preventive treatment.

In spite of this array of facts many persons can be found in the community who do not believe in the exist-

ence of this disease, or if they do are so fond of dogs that they are opposed to muzzling and restraining orders for its suppression. Many of these persons are people of ordinary intelligence and with fair education and are apparently sane in other respects. One would think that if these pseudo dog lovers have no regard for the lives and property of their fellow citizens they ought at least to realize that it is desirable to eradicate this disease in the interest of and for the protection of the very animals they profess to love, as it will be quite as much of a benefit to the dog population to have this outbreak terminated as it will be to other members of the community. If it could be explained to dogs of ordinary common sense and average unselfishness that if they would consent to wear an efficient muzzle, or submit to restraint for the next six months that the disease would practically disappear, any decent dog would gladly submit to these restrictions. Homeless and ownerless dogs would be quite as well off if humanely destroyed, as they are prowling about in a half starved condition. The canine population is quite as much the victim of its friends as is the rest of the community.

There is little time to say much about the symptoms of canine rabies, although this feature of the question has not received as much attention as it should owing to the amount of notice drawn to the existence of the disease and the damage done by dogs with rabies. There is much useful information to be derived by reading the back of a dog license, the law requiring that the Secretary of the State Board of Health shall furnish a description of the symptoms of hydrophobia to be printed on each dog license. First, attention is called to the fact that the law requires that every dog over three months old shall be licensed, and that each licensed dog shall wear a collar around his neck with a plate, upon which the owner's name and the license number shall be engraved. If this

provision of the law were better enforced, and all unlicensed, homeless, ownerless dogs and dogs whose owners did not provide collars prescribed by law were humanely destroyed it would be a great safeguard to the public. Half or two-thirds of the dogs which have appeared in towns with rabies and bitten other dogs, animals or persons have had no collar, or at least no collar with a plate upon it to show who owned the animal or where it came from.

Next on the license is some information upon the treatment of dogs, and the diseases of dogs, which do not seem essential to a dog license. Following this is a description of the symptoms of hydrophobia, which commences by stating that when rabies does not prevail it is a rare disease, and when it does it is not uncommon, and has a tendency to become epizootic. The symptoms then described give a very good idea of the behavior and appearance of a dog with either dumb or furious rabies. Then follows some excellent advice upon the course to be pursued by persons bitten by dogs supposed to be rabid, and also upon the treatment of a dog which has bitten any one.

Persons are advised against the folly of calling a dog rabid because it bites some one, and immediately killing it before it is definitely known whether it has rabies or not. In such cases the dog should be confined and kept under observation for several days; if at the end of a week it is apparently healthy no apprehension need be felt because of rabies. Never use a rope for tying up a dog under these circumstances, as it may gnaw it in two and escape. The owner of a licensed dog is also cautioned not to turn a dog loose to shift for itself because it appears to be sick or acts strangely, advice that has been disregarded with unfortunate results in many instances. Josh Billings said "the meanest thing a man can do to another except doing him an absolute injury is to do him a favor and then keep reminding him of it all the time." But it is meaner still to

kick a poor sick dog out of doors when you don't know what ails him.

It is also recommended in conclusion that the head of a dog supposed to have had rabies should be sent, packed in ice, to the Cattle Bureau, or to any laboratory equipped for making an inoculation test, in order to determine whether or not the animal had this disease at the time of its death.

It would be worth while for every health official in the State to obtain a blank dog license and familiarize himself with the instructions on its back.

Dogs developing rabies often act as though there was an obstruction in the throat, which is due to the difficulty in swallowing because of the paralysis of the pharynx. In these cases don't put a finger down the dog's throat in an attempt to remove the obstruction, as this is often followed by disastrous results. It is dangerous to put the finger or hand in a rabid dog's mouth even if it should not bite, as the skin might be abraded by a scratch from a tooth, or the virus may be absorbed through a fresh cut or scratch on the hand not inflicted by the animal's tooth. Many a veterinary surgeon has found out the danger of such a procedure to his cost. There is also to be noticed the partial paralysis of the lower jaw, the staggering gait, snapping at imaginary flies, the tendency to swallow foreign bodies, such as bits of wood, small stones, feathers, bits of leather and the like. There is often a disposition to run away from home when the disease is about to manifest itself, the animal may be gone a day or two and then return, or may never come home. Rabid dogs frequently run many miles from home, from twenty to forty or fifty miles not being an unusual distance to travel. A change in disposition is another premonitory symptom, the animal acting more affectionate than usual, or becoming morose. There may also be a change in appetite, a fastidious dog becoming voracious, and *vice versa.*

It is not unusual when the disease is developing for the patient to become sensitive, acting affectionately, and if scolded by the owner for attempting to lick the face and hands to suddenly take offense and snap at him. The drooping of the lower jaw, and acting as though there is an obstruction in the throat are not constant symptoms, and may be absent in some cases.

The change in the voice and some of the other symptoms are sufficiently described on the back of each dog license, already referred to. The bite of any carnivorous animal with rabies is dangerous. Occasionally a case is met with in the cat, but in the main it may be looked upon as a disease spread almost entirely by the canine family.

The importance of verifying a diagnosis of rabies in the dog as early as possible if it has bitten persons or other dogs is self-evident. The discovery of the Negri bodies has made it possible in most cases to do this within a day or two of the time of the dog's death, and thus valuable time is saved for persons who have been bitten, and it can be decided if it is necessary to have recourse to the anti-rabic treatment much earlier than formerly when the results of inoculation tests could not be known for about two weeks from the time the dog's head was received at the laboratory.

Great Britain furnishes the best demonstration that rabies is a disease that can be controlled and eradicated, as it has been entirely extirpated in England and Scotland, not a case having occurred there since 1903, while prior to that year it had existed there for centuries. The number of human deaths from rabies recorded during fifty-one years, from 1848 to 1898 inclusive, was 1112; the largest number in any one year was in 1877 when 79 deaths due to hydrophobia were recorded as having occurred among people. (Vide 17th Annual Report U. S. B. A. I.) The number of cases of rabies in England reported among animals in 1895 was 672, a remarkable increase over any

previous year. In 1894 the number of cases was 248. It is said the perpetuation of this disease was due to stray dogs. Of the 672 cases reported as occurring in 1895, two hundred and seventy-three were of this class, and it is suggested that the only means of eradication is to seize the ownerless animals. In the above total are included 55 other animals, five of them being cats. The seizure and slaughter of ownerless dogs as suggested in 1895, and muzzling those that had homes, materially reduced the number of cases of rabies in 1896. During this year 438 cases were reported, and 323 dogs were killed because they had been exposed to the infection. Nearly a third of those attacked were stray dogs. (Vide 14th Annual Report U. S. Bureau of Animal Industry.)

The 16th Annual Report of the U. S. Bureau of Animal Industry states that since 1897 the authorities in Great Britain have been endeavoring to eradicate rabies from the country, not only in the interest of the canine race, but also that of the human being. The muzzling order was enforced wherever necessary in the judgment of the authorities, and inspectors were employed to trace dogs that had been in contact with rabid dogs. Where such dogs were not killed they were isolated for a period of six months. The efforts in this direction are said to have met with marked success, and Dr. Cope (Chief Veterinary Officer to the British Board of Agriculture) says that: 'Unless the disease be again introduced from without, the date of its eradication is apparently not far distant.' "

In the 18th Annual Report of the U. S. Bureau of Animal Industry, it is stated, that "Not a person died of hydrophobia in Great Britain in 1900, the first time in fifty-two years that there had not been a human death from this disease. Dr. Cope says: 'It may truly be said that the board has never undertaken a duty which has rendered

so great a service to the community of this Country, from the point of view of human health, as the extinction of rabies in the dogs.'" In the 21st Annual Report of the U. S. Bureau of Animal Industry, Dr. A. C. Cope, Chief Veterinary Officer, is quoted as follows regarding rabies: "The last case of rabies confirmed in this Country occurred in the month of December, in the year 1902, and as diligent search has failed to discover any other, it is believed the disease is now extinct in the United Kingdom."

The above record of this great work and the results accomplished shows what can be done by the government when the people are thoroughly aroused to the importance of the situation. At present no one is allowed to bring a dog into England from any other country without keeping it in quarantine for six months, and having it examined from time to time by a veterinary surgeon.

Rabies has never been known in Australia, as every dog brought there must be kept in quarantine for six months after being landed.

Of course England and Australia are happily situated, as no dog can run in from any surrounding country. Unfortunately, in regard to rabies, Massachusetts is not an island and rabid dogs can run in here from Rhode Island, Connecticut or New York State, and start an outbreak at any time, after it may have been eradicated in this Commonwealth.

For the sake of comparison the number of cases of rabies in France for a single year may be interesting. In 1904 there occurred there 2393 cases of rabies.

There is abundant law upon the statute books of Massachusetts relating to dogs and contagious diseases to provide for the suppression and control of rabies; the difficulty seems to be in securing its proper enforcement. An order to keep dogs properly and securely muzzled or restrained from running at large for three months seems

to be hardly sufficient, judging from the dogs that have developed symptoms of this disease from four to five months after being bitten by a rabid animal, although these cases are exceptional. Most cases result in from a little over two weeks to eight weeks, between three and four weeks being a very common period. An order of this kind to continue in force for six months would be better, and it should be strictly and impartially enforced. Meanwhile the stray and ownerless dogs should be corralled and humanely destroyed.

Many of the contrivances sold as muzzles are not effective, and unless a dog in a town where a muzzling order is in force wears an efficient muzzle, he should be looked upon in the same light as a dog that does not wear any.

I have here various patterns of muzzles which may prove of interest.

While I feel that I might go into this subject much more fully, I fear that it might be wearisome to treat it at greater length at this meeting. Thank you for your kind attention.

(Dr. Peters then exhibited several forms of muzzles and commented on their efficiency or lack of it. Many of the leather ones, notably one making practically a figure 8, are simply evasions of the law, since while passing as a muzzle they do not prevent the dog from biting. One leather form, having a double strap around the nose, appeared efficient and at the same time probably more comfortable than a wire muzzle.

The wire muzzles are usually efficient and probably not particularly uncomfortable if of the right shape and size. One form shown would allow a dog to open and shut his mouth but would prevent his biting.)

THE PRESIDENT: Before proceeding to the discussion of this paper we will listen to two reports. Mr. Newcomb.

Mr. Newcomb, in the absence of Dr. Marion, Chairman of the Nominating Committee, presented the following report:

MR. NEWCOMB: The Nominating Committee, Mr. President, in selecting officers for the ensuing year, bring forward the old list, as follows: Dr. Walcott, President; Dr. Durgin, 1st Vice-President; Dr. Chapin, 2nd Vice-President; Mr. James C. Coffey, Secretary; Dr. Field, Treasurer.

The terms of 5 members or one-half of the Executive Committee having expired, the the following members have been nominated for a term of two years: Dr. E. L. Fiske of Fitchburg, Dr. C. H. Eidam of Lawrence, Dr. F. A. Woods of Holyoke, A. M. Wilson of Brookline, and Dr. M. V. Pierce of Milton.

THE PRESIDENT: Gentlemen, you have heard the report of your committee. What action will you take thereon?

DR. WORCESTER: I move that these nominees be made the officers for the ensuing year.

(The motion was seconded, and the nominees of the committee were elected officers of the Association for the ensuing year.)

DR. FIELD: Mr. Chairman, is there opportunity to bring in a little more business at this time?

THE PRESIDENT: The report of the Treasurer is certainly in order.

DR. FIELD: In addition to the report of the Treasurer I would like to recommend for honorary membership Dr. H. W. Hill of Minnesota. Most of us here will remember him as the bacteriologist of the Boston Board of Health

and as the editor of our Journal, reflecting credit upon us in every position he held, and giving us the opportunity of listening to many valuable papers. He is on our active list of membership, but as he cannot be with us it seems no more than right that we should honor ourselves by electing him an honorary member. I move that Dr. H. W. Hill of Minneapolis be made an honorary member of the Association.

DR. DURGIN: It gives me great pleasure to second this motion.

THE PRESIDENT: You have heard the motion made by Dr. Field and seconded. Is it your pleasure that Dr. Hill be made an honorary member of this Association? If so, you will signify it by saying Aye, contrary minded No. It is a unanimous vote.

THE REPORT OF THE TREASURER FOR 1906.

DR. FIELD then read the report of the Treasurer for the year 1906 as follows:

RECEIPTS.

Balance from 1905	$1329.07
Interest	41.22
Annual assessments for 1906	480.50
Annual assessments for previous years	50.00
Annual assessments for future years	19.00
Total	$1919.79

EXPENSES.

Postage	$46.00
Printing	26.75
Cigars and dinners for guests	37.05
Clerical Assistance	39.50
Treasurer's bond	4.00
Report of meetings	129.30
Printing Journal, two numbers	111.38
Use of stereopticon	10.00
Total	403.98
Balance to 1907	1515.81
Total	$1919.79

Of this balance, $1062.00 draws interest in the Central Savings Bank, Lowell.

Respectfully submitted,

JAMES B. FIELD, Treasurer.

Examined and approved as correctly cast and properly vouched for.

J. ARTHUR GAGE, Auditor.

January 18, 1907.

DR. FIELD: I would like to say that the Auditor in examining this report asked the question which I presume many of you would ask. "What are you going to do with this large surplus?" The Treasurer figured out very carefully that on our present ratio of expense we could not as yet reduce the assessment from $2.00 to $1.50 and meet our bills, and until our Journal becomes more self-supporting than it is at present it seems that we will have to continue at our $2 rate. I am in hopes that eventually, when the Journal becomes entirely self-supporting, we may reduce to a $1.50 rate, and possibly to a $1 rate, but at present the surplus has its uses, because if we should fail to make a satisfactory contract for the Journal we would in the course of a few months wipe out all the surplus that we have.

THE PRESIDENT: This most satisfactory report will be received and placed on file.

Before proceeding to the discussion of Dr. Peters's paper, I should like to report that at a previous meeting of this Association you appointed a committee to procure with regard to tuberculosis the same exclusion from the penalty of poverty when a case of tuberculosis is treated in a public institution or at the public charge that now prevails with regard to certain other contagious diseases. As a member of a commission which has recently made a report to the State of Massachusetts, a modification of the statutes to secure that object has been made a portion of the report, and I will therefore report that as the action of the committee appointed by this Association. That is, if the modifications proposed by this commission are adopted, and I have no question this action will be taken, the patient suffering from tuberculosis will be in the same category with the patient suffering from scarlet fever, smallpox, or any other

disease dangerous to the public health, and will not become a pauper by reason of that public aid.

Discussion of Dr. Peters's paper is now in order.

DR. PETERS: Mr. Chairman, one or two members of the Legislature have been to see me lately in regard to rabies, and some of them seem to have a similar idea as to people who have to receive state aid in going to Tewksbury and receiving the anti-rabic treatment, that they ought not to be considered as paupers because they have had to go to Tewksbury and receive treatment there, that they ought to be classed in the same category that you were speaking of extending so as to include people with tuberculosis.

DR. DURGIN: I am particularly delighted with Dr. Peters's paper. It should be very serviceable, with regard to these muzzles. I have recently seen in Boston no muzzle except that which has been subject to merited ridicule this afternoon. It does not seem to me that it is of any special use as a protection against the dog's bite. But it is extremely important, it seems to me, if we are going to muzzle dogs, that we should understand what a secure and substantial muzzle means.

PROFESSOR SEDGWICK: Mr. President, I have met with this statement,—and I wonder how much truth there is in it,—that the principal value of muzzling consists in the fact that it brings all kinds of dogs under inspection, the implication being that the muzzle as a muzzle did not amount to much anyway. I should like to ask Dr. Peters if that is a fact, and, in addition to that, whether he can tell us of any cases in which muzzling has really prevented a rabid dog from doing harm. I daresay there are such cases. I am simply very ignorant on this subject and should like information.

DR. PETERS: I don't think of any cases now, Mr.

Chairman, where rabid dogs with muzzles have bitten people. I think most of the rabid dogs that have done damage have been unmuzzled. I remember a case a year ago when they had a muzzling order in force in Grafton. A dog ran away from home one day; I think it was Sunday. He disappeared about one o'clock Sunday, just about dinner time, and the next morning he was down at Kingston, the next town to Plymouth; that is, he had run a distance of 40 or 50 miles in 18 hours. He had a muzzle on that consisted in a leather strap that was rather tight around his nose, and pieces from that, like the side pieces of a halter, that held it on went around the back of his neck and fastened there. I saw the head when it was brought to the office; the muzzle was still on, and I thought that that muzzle probably prevented the dog from doing any harm. I do not think that a muzzle necessarily has got to be made of wire to be an efficient muzzle, but it should be a contrivance to prevent a dog from biting. Some of these leather muzzles are efficient. They perhaps might be more comfortable to some dogs than a wire muzzle. But a wire muzzle is certainly a very good form of muzzle, I think as effective as any. A muzzle, made of leather, with a couple of straps around the mouth, and the nose stuck into it, and fastened round the neck, I think is an efficient muzzle. Some people might prefer a leather muzzle to a wire one. I don't mean to endorse any particular form of muzzle, but I think that the muzzle used should be an effective one. I also think that there is a good deal of truth in what Dr. Sedgwick says about the muzzle, whether it is effective or not, being a distinguishing feature. I think that a dog wearing any kind of a muzzle, when a muzzling order is in force, looks as though he had an owner who took enough interest in him to spend 25 cents for a muzzle anyway, and I think those dogs are not as likely to do harm as the stray dogs that have no owners and no homes.

MR. NEWCOMB: Mr. Chairman, doesn't it appeal to you if the enforcement locally of the dog license movement were done more effectually, it would accomplish a great deal towards preventing rabies canina? It strikes me so; it strikes me forcibly. I fancy there may be quite a proportion of those here who are dog lovers, undoubtedly they also love their own existence and the preservation of the same, but is there an animal that will leave its own kind and devote its time and service much more faithfully to you than a dog? It strikes me, and I feel just like saying it, that if each one of us when we go back to our respective communities will advocate a better enforcement of the dog license movement, a large part of this matter will be looked after, and incidentally I don't see why it would not be a good plan to look after cats too. (Laughter).

Now, the next point, with reference to the muzzling act. I would like to ask any man, with these different questions before him, if it does not seem to him that it would be a reasonable proposition to ask for a little more co-operation between the Cattle Commission and the local authorities on this dog license question. Could not a little advice be spread round, and would it not be beneficial? More particularly I would like to ask, now that the muzzling order is in force, and when you consider that the only place a dog can perspire is from his tongue, when is a dog at large? Is a dog at large when he is with you on the street on a leader? There are some salient points to be considered. Through the Chairman I would like to ask if Dr. Peters will enlighten us. Considering how little of this question we have had to consider within recent years, and the agitation at present, it brings up these points, and it seems as if, although I may be somewhat clumsy in presenting the matter, there still is something to be presented and something to be learned about it. I would like to ask if I go along with a dog that I know is good and all

right and has not been disturbed, if that dog is at large when it is on a leader with me on the street. These are simple points, but I speak as a dog man, valuing my own life as much as the average person without a doubt.

MR. PETERS: Mr. Chairman, the law states that aldermen in cities and selectmen in towns may order that all dogs shall be muzzled or restrained from running at large, and I think a liberal view to take of the law is that if a man has a dog on a leash he is restrained from running at large. I don't think that restraining him from running at large means that you cannot take him out and exercise him without a muzzle, if you want to. The same point holds good again, that if the dog is on a leash and a man is on the other end, it shows that that dog has got an owner who is not going to let him run off and do any damage, and that is what we want to prevent.

DR. BURR: In Boston, it seems to me as though we have had a little different experience in regard to rabies. It has not been in our stray dogs. Most of the dogs which have been affected in Boston have been licensed dogs, and if not licensed were dogs that received just as much care as a licensed dog, not being licensed simply from carelessness. We have not found it in what you would call stray dogs in a district. I want to emphasize what Dr. Peters said in regard to the muzzling of dogs. It seems to me that there is only one way in which we can eradicate rabies, and that is by the efficient muzzling or restraining of dogs. Dr. Peters said that we were unfortunate in that Massachusetts was not an island, but it seems to me, if I am right, that New England is an island in so far as its geographical relation to the rest of the United States. Having this in mind I think it is a point worth considering whether the New England states should not combine to eradicate rabies from New England. It seems

to me it is a way by which New England can be kept free from rabies.

DR. PETERS: Mr. Chairman, although the cases Dr. Burr has seen were licensed dogs, which had kind and loving owners who tied them up and sent for a veterinarian and then notified the Board of Health, I would like to know what the dogs were that bit these licensed dogs. I don't suppose they were cases of spontaneous origin exactly. Weren't they stray dogs that no one knew anything about and that disappered after they had done the mischief and then crawled off and died?

DR. BURR: Unfortunately, if my case is the same as the others, we don't find that dog. We have known of some dogs that have come into the city that were licensed dogs, and some licensed dogs have transmitted the disease to our licensed dogs in the city. My purpose was to show that even well cared for and licensed dogs do contract and transmit the disease. I certainly advise the picking up and humane destruction of unlicensed and homeless dogs.

DR. PETERS: Some licensed dogs in Boston have gone outside of Boston and carried rabies to outlying towns.

PROFESSOR SEDGWICK: Mr. President, I think this is a good time for us to remember that in all these health matters we are too much cut up into little town affairs, and have not that large way of looking at things that we ought to have. It is perfectly absurd for one town to have muzzles and another town nearby not to have them, or for one state in New England to have them and another one not. The splendid work which was done in Great Britain,—which ought never to be forgotten, for it is one of the monumental pieces of health work,—was done by virtue of the fact that they could control the whole district. Sooner or later we have all got to get away from

these ideas of little local town affairs, and realize that in these days, with state roads and railways and such like, our unit is much bigger than the old fashioned New England town. The sooner we get rid of that idea I think the better we shall get on in a good many health matters.

DR. PETERS: Mr. Chairman, I did not put it in my paper, but as a matter of fact I have done a good deal lately in the endeavor to try and get all the contiguous cities and towns to issue these muzzling orders at the same time. In Lowell, and Dracut, and Methuen, and Lawrence, and Haverhill, and Tewksbury, and Tyngsboro, and North Andover, towns in the Merrimac Valley, together, they have muzzling orders in force. And also they have done the same in Waltham, and Newton, and Watertown, and Arlington, and Brookline, and Quincy, and Hyde Park, and Dedham, and Westwood. By getting a large area where these orders are in force I think that perhaps we can make some progress in reducing the amount of rabies.

THE PRESIDENT: Is there any other business to come before the Association at this time? If not, it is moved that we now adjourn.

(The motion was adopted and the Association adjourned).

MUNICIPAL SANITATION.

By Charles V. Chapin, M. D.,

Superintendent of Health, Providence, R. I.

THE PASTEUR HOSPITAL FOR CONTAGIOUS DISEASES* represents in its construction and management the latest French ideas. At present the hospital, which is situated in a crowded part of Paris, consists of

*Rev. d'Hygiene, Mars 1903, p. 256.
Le Bulletin Medical, 19 Mars 1904, p. 251.
Soc. Med. des Hop. 1904, p. 297.

two pavilions of two stories, designed for 48 patients in each pavilion. The buildings are constructed in the most up to date manner to prevent the accumulation of dirt and facilitate disinfection. But the interesting feature of the establishment is the means taken to secure the isolation of the patients, one from another. In each pavilion are two wards with 12 beds each, for convalescents, though a later plan is to divide this into rooms for 3 or 4 patients. There are also on each floor 12 separate rooms with glass partitions. Each room opens into a central corridor and also onto a balcony or piazza. When a patient arrives at the reception room all the clothes are removed and the patient is carried on a rolling bed to one of these little rooms or cubicles. Each cubicle has its bed, table, chair, toilet, and eating utensils, and a bowl in which attendants are to wash and disinfect the hands. For the latter purpose, corrosive sublimate in the strength of 1-4000 is used. The doors leading into the corridor are often left open. The cleanliness of the operating room is maintained at all times. Scarlet fever, diphtheria, measles, small pox and other diseases are often cared for in cubicles opening into the common corridor, and by nurses and physicians passing directly from one to the other. Nothing goes out of a cubicle but to be at once disinfected. Nothing is brought in except what is sterile. When the nurse or physician enters the cubicle a gown kept in the cubicle is put on, the sleeves being rolled up so that the arms are bare; the patient cared for, the gown is removed, and the hands washed in corrosive solution, then with soap, and then rinsed again in corrosive solution, and then the next patient is visited. This practice is called *"antisepsie medicale"* and is as carefully carried out as is the asepsis of the surgeon. To treat scarlet fever, diphtheria and measles in rooms opening into a common corridor would by most of us be considered the height of folly, yet I saw this very thing being done in Paris last summer. The perfect manner in which this

medical antisepsis was automatically carried out by the nurses was remarkable. What are the results? In four years 2750 cases of all types of communicable diseases were treated in this manner with a transfer of infection in only seven instances, and not all of these were due to defects in the system. One was entirely due to a mistake in diagnosis and three may have contracted variola just before admission. The success of this hospital depends upon the admirable training of all connected with its management, and upon the discipline maintained, rather than upon details of construction. Dr. Gordon-Pugh, in the North Eastern Fever Hospital in London, is doing substantially the same work in crude home-made cubicles put up in an old wooden ward. It is assumed by some that the success of the Pasteur Hospital depends on the prevention by means of the cubicles of aerial convection. Thus I have seen an American hospital management put in cubicles, but take little or no more care than before, to prevent contact infection. It is worthy of note also that at the Hospital Enfantes Malades there are no real cubicles but merely glass screens between the beds, but the same system of medical antisepsis is followed as at the Pasteur Hospital and with excellent results.

RABIES IN PROVIDENCE. Between July 28, 1906, and January 31, 1907, there were killed in Providence about forty animals proved to be rabid by the presence of Negri bodies found in the brain after death. Many other animals were from the symptoms evidently rabid, and some of these caused the disease in dogs which they bit. During this time 51 human beings were bitten by presumably rabid animals and in nearly every instance demonstrably so. All but five of these people have had or are having the Pasteur treatment so called. Of these 35 went to the Pasteur Institute in New York. The expense of course was very great, and it was usually a good deal of trouble

to send the patients to New York. Since November the treatment has been applied at the Rhode Island Hospital in Providence. Arrangements have been made by which rabbits cords are sent on daily from the Board of Health of the City of New York and the emulsion is made in Providence and at once injected. It is a great comfort to the patients that they can remain at home, and a relief to the health department. Moreover as we pay a lump sum for the service for six months, in a doubtful case we do not feel that we are going to an expense which is perhaps needless. Since November twenty-third, ten patients have been treated or are being treated in Providence.

SANITARY ENGINEERING NOTES.

By Robert Spurr Weston, Assoc. M. Am. Soc. C. E.

STREAM POLLUTION BY ACID-IRON WASTE AT SELBY, OHIO.* The discharge of acid-iron liquors from a large factory into the city sewer decreased largely the nuisance due to its direct discharge into the river, but resulted in great damage to the purification plant, because of lack of capacity for the added flow, and because of the chemical effect on the filter. The effluent was very obnoxious because of the iron. The addition of the acid decreased the odor around the plant. A plant for the recovery of copperas was installed, recovering one-fifth of the acid and reducing the objectionable features of the sewage by 60 per cent. Addition of lime or ammonia might lessen them still more.

DISTRIBUITON OF SEWAGE BY SPRINKLERS.† Wm. G. Saylor, Resident Engineer Sewage Disposal Works, Waterbury, Conn., has recently made some ex-

*Eng. Rec., 55, 26.

†Eng. Rec., 55, 10.

periments on the relative efficiency of various forms of sprinklers for sewage filters. Revolving sprinklers, troughs and mechanical carriers being unsuited for severe winter climate, most of the experiments were made on nozzles, which were found very satisfactory. He found it necessary to use nozzles having large water ways and few openings, with a mechanical device for control under a dropping head. As nozzles in general have to cover a square area with uniform spray the cross section of the deflectors was made fluted rather than circular.

PURIFICATION OF SEWAGE AT STRATFORD-ON AVON§. A plant for the purification of sewage at Stratford-on-Avon has recently been completed, including "liquefying" tanks, percolating filters, sand filters and land treatment or broad irrigation. The plant is designed to treat 300,000 gals per day, dry weather flow, including trade waste, as well as 600,000 gals. storm flow. For further storm flow up to 900,000 gals. there are extra contact beds. The liquefying tanks have a capacity of 1 1-2 times the dry flow; percolating filters have an area of about 1-2 acre. There are about 2 acres of intermittent sand filters; about 10 acres of ground soil withunderdrains are provided for the land treatment. The capacity of the contact beds is about 3,000,000 per acre per 24 hrs. Cost of work about $114,000.

STERILIZATION OF SEWAGE AFFLUENT† at the Mass. Institute of Technology Sewage Disposal Station. Phelps and Carpenter state that ordinarily it is not the function of sewage filters to remove bacteria from sewage. function of sewage filters to remove bacterial from sewage. Disease germs may survive rapid filters. Shell-fish bear-

§Eng. News, 56, 658.

‡Tech. Quart., 19, 382.

ing waters must not be polluted. Either sand filtration or chemical sterilization must be used for their protection. Effluents can be freed from objectionable bacteria by chlorine, either from chloride of lime or as a gas, at a cost of $1.05 per million gallons. Electrolytic chlorine might be used at a cost as little as $0.85. Copper sulphate is the most promising of the other agents tried.

IS IT WORTH WHILE TO STRIP THE SURFACE SOIL FROM RESERVOIR SITES?* This long abstract of a long report concludes,—

First: That the stripping of the Ashokan Reservoir, in itself, will not sufficiently prevent tastes and odors so as to allow water of satisfactory quality to be obtained from it at all times.

Second: That aeration at a small fraction of the cost will do fully as much in removing tastes and odors as stripping would do in preventing them.

Third: That water of perfectly satisfactory quality can be obtained by aeration and filtration.

Fourth: That this result can be just as certainly and fully accomplished in this way if the Ashokan Reservoir is not stripped, as if it is stripped.

METHOD FOR TESTING AND COMPARING SEWAGE SPRINKLERS.† The author describes the types of sewage systems; also tests of sewage sprinklers. From the results of these experiments the so-called distribution coefficient has been derived mathematically. The use of this permits one to make experimental comparisons of sprinklers with greater precision.

*Allen Hazen and Geo. W. Fuller. Eng. News, 57, 8.

†Earle B. Phelps, Eng. News, 56, 410.

REFUSE DISPOSAL IN THE BOROUGH OF RICHMOND, CITY OF N. Y.‡ As the result of two years' study and investigation, the authorities of the Borough of Richmond, New York City, have made public plans and specifications for a mixed municipal refuse destructor. Work has been under the general direction of L. L. Tribus, C. E., and the personal charge of J. F. Featherston, C. E.

The Borough is divided into two collection districts. The transportation problems were serious and no existing garbage crematory was found which satisfied the conditions. The British method of destroying mixed wastes seemed to be the most promising and investigation was directed toward the feasibility of using this process. The average amount of ashes and rubbish collected in the district is 2.77 cu. yds. or 1.16 short tons per 1000 inhabitants per diem. These materials range from about 85 per cent. of the total refuse during the winter to about 50 per cent. in the late summer. The average amount of garbage (swill) is 0.91 cu. yds. or 0.425 ton daily per 1000 people. The amount ranges from less than 15 per cent. of the total refuse during the winter to about 50 per cent. in the late summer. Of the entire refuse for one year 34.7 per cent. by weight was fine ash, 1.8 per cent. was clinker, 4.8 per cent. was glass and metal, 26.7 was coal and cinders rejected by the screens and not otherwise classed, 22.6 per cent. was vegetable garbage, 1.2 per cent. animal garbage, 1.1 per cent. free water lost in handling the garbage, and 7.1 per cent. rubbish. The coal and cinders had an average calorific value of 4900 B. t. u., the garbage 8240 B. t. u. after drying, the rubbish 8440 B. t. u., while the fine ash and clinker had no calorific power.

The destructor must be capable of burning 120,000 lbs. of mixed refuse of the general composition that occurs in

‡Eng. Rec., 54, 628.

winter. The report shows the general arrangement of the plant. The destructors are to be built after the English type and are to be arranged in cells. The plant is to be run week days and cleaned on Sundays. The contractor must guarantee that the residue shall be hard, free from organic matter and thoroughly burned; that it shall be without nuisance; that the temperature of the combustion chamebr or main flue shall not fall below 1250° F.; that arrangements must be made for the withdrawal of the dust after one day's cooling of the fires; that a minimum or seasonal rate of evaporation and also an amount of net useful steam per pound of refuse burned be guaranteed; that the amount of material that can be handled during an 8-hr. period by a high grade stoker must be stated and that the refuse must be destroyed at the rate of 2 1-2 tons per hour when its character is that shown by the data. It is supposed to utilize the excess heat for raising steam, but no use for the steam has been proposed, beyond driving the machinery in connection with the plant itself.

EXPERIENCE WITH FINE GRAIN PERCOLATING FILTERS.* Dr. George Reed gave evidence before the Royal Commision on Sewage Disposal concerning the operation of a sewage bed at Hanley, England. Results were presented after three years' experience. The filters recivd sptic tank effluents. The beds were of fine material, 1-4-inch to 1-8-inch.) 73 per cent. of suspended solids were removed in the detritus tanks and 15 per cent. in the septic tank effluents. The bed swere of fine material, (1-4-inch to 1-8-inch.) 73 per cent. of suspended solids were removed in the detritus tanks and 15 per cent. in the septic tank. Sewage applied to filters contained 7.6 parts of suspended matter per 100,000, exactly one-half of which was mineral matter.

*Eng. Rec., 54, 444.

The suspended matter is practically all retained in the top layer of the filter, where the organic portion is said to be liquified. It required 12 minutes for the sewage to pass down through the upper foot of the filters, where most of the purification is effected, while 35 minutes were consumed in the passage of the sewage through the filter. There is more free ammonia in the sewage 4.5 ft, below the surface of the filter than 1 ft. below and the reduction in albuminoid ammonia and oxygen consumed is equally striking. Most of the nitrification takes place in the upper foot.

The author believes that fine trickling filters are less liable to clog at the surface than are coarser ones, unless comparison be made with very coarse filters such as those in use at Leeds.

Regarding the alleged defective aeration of fine beds, the author states that the high nitrification is a refutation of this argument. The experiments showed that there was a free current of air through the filters. After the experiments were completed it was shown that the filter material was colored and tarnished only to a depth of from 14 to 18 inches and that the organic matter in the filter material below one foot was nearly constant.

The author also gave evidence that filters in Somersetshire showed similar results when their upper layers, which were composed of clinkers varying in size from 3-4-inch to 1-2-inch, were replaced with a layer of fine granite chippings. Part of the filter was thus altered and part not. The improved quality of the effluent from the altered section of the filter at a depth of 3 ft. compared with those from same section and the unaltered section at a depth of 4.5 ft., is shown by numerous comparative analyses.

CHEMICAL AND BIOLOGICAL SURVEY OF THE WATERS OF ILLINOIS. Published by University of Illinois, Urbana, Ill.

This pamphlet gives analyses and method of analysis of the waters of Illinois, showing their chemical and bacteriological character from a sanitary standpoint.

WATER FILTER OF THE JACOB TOME INSTITUTE.* Formerly the water supply was from a reservoir fed partly by springs, partly by surface water. This mixed supply, although filtered, developed disagreeable odors and tastes after being in use over 3 years. Lately the spring water has been collected separately and mixed with the reservoir water directly before filtration. A new filter plant has been constructed after designs by James H. Fuertes.

The water is tréated by double filtration, with double aeration before filtration and single aeration between the two sets of filters. The unfiltered reservoir water is often devoid of oxygen while the spring water contains 40 parts of carbon dioxide per million. The effluents show a fair percentage of dissolved oxygen, are free from odor, and show high bacterial efficiency.

REMOVAL OF IRON FROM THE WATER SUPPLY AT READING, MASS.† The water from the filter gallery contains varying proportions of iron and organic matter, depending upon varying local conditions. Simple aeration, subsidence and filtration fail to purify the water. Experiments were undertaken to demonstrate the feasibility of removing the iron by treatment with metallic iron in various forms, followed by subsidence and filtration,

*Eng. Record, 54, 572.

†Eng. Record, 54, 601.

with and without aeration. Of the method used for adding metallic iron to the water, the electrolytic method, using iron plates and a low potential current, was found to be the most practicable. The method by direct contact failed at certain times. When the water was treated by this method the iron was satisfactorily removed, except during two or three short periods during the year. The process was not very economical on account of the frequent clogging of the filter. Experiments are being continued.

THE WASHINGTON TYPHOID SITUATION AND HOW THE BALTIMORE WATER DEPARTMENT HAS PROTECTED ITS SUPPLY WITHOUT FILTRATION.‡ The author notes the fact that the installation of new filters at Washington has not effected the expected reduction in typhoid fever; neither would filters, in his opinion, reduce typhoid fever in Baltimore. In spite of the fact that health authorities and ill-informed agitators have attributed the high typhoid fever death rate in Baltimore to the character of the water supply, Quick believes that such a conclusion is not warranted by the facts.

The inspection of the watershed is very rigid and is effected with the cooperation of the rural health officers. The population is only 31 to a square mile. The Department has prepared very complete maps and records of sources of pollution, which have been the basis for planning schemes for the abatement of individual pollutions, of which 530 have been secured during the past six years. Special inspection was made of typhoid fever cases on the watershed and all affected wells are closed. There are only 50 to 75 cases of typhoid on the drainage area each year.

‡A. M. Quick, Eng. News, 56, 569.

In addition to sanitary inspection, further protection is afforded by the long storage in the reservoir. This amounts to from 26 to 41 days. In Baltimore, itself, however, there are many possible sources of infection. The city is unsewered; its inhabitants recreate themselves in the counties of Maryland and Virginia where typhoid is very prevalent; thousands of men and boys bathe in the public baths using water which is virtually weak sewage; the contents of city cesspools are used to fertilize market gardens; many of the dairies are unsanitary, 100 cases being attributed to one, for example; many polluted wells remain in use although hundreds have been condemned, and notwithstanding the open sewer gutters the majority of the houses are unscreened.

For its own information the Water Department investigated the typhoid fever cases in the city, which study showed that two-thirds of the hundreds of cases were infected outside of the city, and that without attributing any of the disease to the milk, ice or vegetable supplies, three-fourths of the typhoid was attributable to some cause other than the water supply, and the milk, ice and vegetable supplies may explain the source of some of the remaining quarter of the cases.

The author does not mention that in Baltimore, as a rule, as in Washington, the servants do not live in the houses with their employers, but migrate daily to and from their often unsanitary quarters.

The experience is an illustration of what long storage, aided by good policing of the watershed, will accomplish for the protection of a city, and while filtration would undoubtedly afford better protection, the city does wisely in diverting its present attention toward the better general sanitation of the municipality.

VENTILATION OF BOSTON SUBWAY.* The author gives a very condensed statement of conditions

*By Carson, Am. Soc. Mech. Engr., 28, 50-64; also 28, 958-961.

affecting ventilation of the original Boston Subway, the East Boston Tunnel and the new Washington St. Tunnel. About 80,000,000 people use the Subway yearly. In general all the tunnels are ventilated by taking in fresh air at the stations and portals and discharging it from the traffic tubes at midway points. In the East Boston tunnel, however, provision was made to conduct the vitiated air to the shores by means of a special duct.

The carbon dioxide in the air of the Subway was found to vary between 6.53 and 9.45 parts in 10,000 volumes, samples being taken between 5.00 and 5.30 P. M. on week days in January and February. The air in the center of a car on Boylston St. about to enter the Subway contained 25 parts of carbon dioxide in 10,000 volumes and the air on the street in the central part of the city from 4.4 to 5.9 parts. Ventilation is aided by fans, and the cost is less than 1 per cent. of all costs of operation and interest.

LABORATORY NOTES.

By Frederic P. Gorham,

Associate Professor of Biology, Brown University, and Bacteriologist, Providence Health Department.

OPSONINS. "Through the researches of Wright and Douglas* it has been established that the phagocytic effect of human leucocytes upon certain bacteria is essentially dependent upon the presence in the blood plasma and serum of substances which they have termed opsonins."§

A comparison between the number of bacteria ingested

*Proc. Roy. Soc. 1903, lxxii, 357; ibid. 1904, lxxiii, 128; ibid. 135, and ibid. 147. For a complete list of the works of Wright and his associates see Wright, Lancet, 1905, 2, 1598.

§Simon, Lamar and Bispham, Jour. Experimental Medicine, 1906, viii, 651.

by the leucocytes of a given blood and the number ingested by the leucocytes of normal blood is termed the opsonic index of the blood.

Methods of determining this opsonic index are still in the experimental stage but perhaps a review of some of those thus far recommended may be of use.

The original method of Leischman† of which that of Wright and Douglas was a modification, consists in mixing equal parts of blood and bacterial suspension and placing a drop of the mixture on a slide, covering with a cover-glass, and incubating at 37°C. The slide and cover are then drawn apart and the resultant smear stained with Leischman's stain.

Wright's modification of this method was as follows: A sample of normal blood is mixed with one tenth of its volume of a ten per cent. solution of sodium citrate. The corpuscles are isolated from the plasma by repeated washings with physiological salt solution and centrifugations. The washed corpuscles are then mixed with equal parts of the serum to be tested and the bacterial suspension. The serum to be tested is obtained by allowing a sample of the blood to clot in the usual way. The bacterial suspension is made by rubbing up in physiological salt solution a portion of a twenty-four hour agar culture of the organism against which the opsonic power of the blood is to be tested. The mixture is incubated at 37°C. for fifteen minutes, smears are made and stained with Leischman's stain. Finally the number of ingested bacteria is counted in a series of polynuclear leucocytes and the average for one leucocyte is calculated. This average compared with that obtained in the case of normal bloodserum gives the opsonic index of the blood under examination.

With this Leischman-Wright method as a starting point we find the modifications becoming more numerous every

†Leischman, Brit. Med. Jour. 1902, i. 73.

day. Most of these look toward a standardization of the methods, a simplification of the technique or modifications in staining.

MacFarland and L'Engle in a paper read before the Society of American Bacteriologists at the Ann Arbor meeting* urge the importance of securing uniform suspensions of the bacteria and they described a "nephelometer" which they recommended for use in comparing different bacterial suspensions. They also recommend the use of Marino's stain for the smears.

Simon, Lamar and Bispham† in their "Contributions to the Study of the Opsonins" give a very careful outline of their method which is too long to be quoted here but which gives an idea of the most recent development of the technique.

In an article by Rosenow§ on the "Rôle of Phagocytosis in Pneumococcus Infection" we find the suggestion that the mixture of bloodserum, leucocytes, and bacteria, should be kept in motion during the period of incubation, in order to prevent them from becoming distributed unequally, and so approximating more closely *in vitro* the conditions in the circulation.

He says "I devised a small shaking machine that could be placed in the incubator. With this modification in the technique phagocytosis is perceptibly increased and the results obtained would seem more reliable because phagocytes and pneumococci are brought into closer contact. The shaking must not be too vigorous otherwise the leucocytes are broken up. About 120 to 150 vibrations per minute with a shake of three millimeters is the most satisfactory. This is just sufficient to keep the corpuscles and leucocytes equally suspended and does not break up the leucocytes."

*Science, 1906, xxiii, 218.
†Jour. Exper. Med. 1906, viii, 651.
§Jour. Inf. Diseases, 1906, iii, 684.

BOOKS AND PAMPHLETS REVIEWED.

DIPHTHERIA—ITS PREVENTION, RESTRICTION AND SUPPRESSION.

Issued by the Illinois State Board of Health, 1906-1907.

The State Board of Health of Illinois has recently issued pamphlets bearing the above title. Similar pamphlets have also appeared on Scarlet Fever and Typhoid Fever. This literature is written in clear, concise language and is sufficiently free from technicalities as to render it easily understood by the laity for whom it is evidently intended.

The education of the people along such lines as these is a step in the right direction and the advice given is, on the whole, excellent. Particularly good is the admonition to call the physician without delay in all doubtful cases and the statements regarding the benefits of the early use of antitoxin.

It is somewhat to be regretted that the author of these pamphlets has called particular attention to sewer gas as a cause *per se* of infection, since experiments made within recent years by competent workers have shown the air from sewers to be practically free from bacteria of any kind. Were it in fact true that disagreeable odors were carriers of infection, the people themselves would take more interest to learn how best to avoid infection.

It is also our opinion that too much attention has been called to filth and its effect in lowering vital forces so that the body becomes more susceptible to disease. While this is true in a degree and while it is desirable to get rid of filth for good reasons we believe it positively harmful to so emphasize these points as to distract attention from what is the more usual channel of infection—direct contact.

TROPICAL MEDICINE, WITH SPECIAL REFERENCE TO THE WEST INDIES, CENTRAL AMERICA, HAWAII AND THE PHILIPPINES.

BY THOMAS W. JACKSON, M. D.

P. Blackiston's Sons & Co., 1907.

As our insular possessions and the Panama Canal have brought us a deeper interest in the people of the tropics, so also has the medical profession been brought in closer touch with the diseases prevalent in hot climates. As has been stated in the paper on Leprosy elsewhere in this Journal, the returning soldiers from the Philippines and the closer commercial relations with tropical lands will undoubtedly result in the importation of such tropical diseases as can gain a foothold in our climate. It is thus with a feeling of greater interest that one now opens a book on Tropical Medicine.

The author having been Asst. Surgeon for the U. S. Volunteer Troops has drawn on his own personal experiences to a considerable extent in citing cases and describing symptoms. This leads in places to a rather extensive use of the personal pronoun. While this might be objectionable to some it certainly adds a peculiar charm, making the perusal of this book more of a pleasure than a task.

The book is tastefully bound and well illustrated, but one cannot say as much for the typographical work, misspelled words being somewhat common, especially in the first part of the volume. One contradiction has been noticed :—On page 203 the statement is made that "leprosy is an exceedingiy infectious and contageous disease," while on page 210 one finds that "leprosy is so feebly contageous . . . . that it might be well to abandon isolation," etc.

The author makes the point that the times of threatened invasion of plague "nothing less powerful than the national authority will be satisfactory"—since locally "there will always arise bitter protest on the part of the public, or at least a portion of the public, on the ground of interference with

commerce and the hardships and damage to the community or state." This statement recalls the effort to suppress the truth in regard to the presence of plague in San Francisco some years ago, as an opposite picture the efficient way in which the plague was stamped out by the national authorities at Mazatlan, Mexico, and is in itself a strong plea for the establishment of a national board of health in the United States with a cabinet officer at its head.

The book in general is up-to-date and will well repay careful reading.

SURGICAL SUGGESTIONS.

Practical Brevities in Surgical Diagnosis and Treatment by Walter M. Brinkner.—Surgery Publishing Co., 1906.

This little book takes up the human body part by part, giving practical suggestions presented in such a way that they will be recalled when the condition is met. Useful alike to student and practitioner. B. L. A.

PHYSICIANS VISITING LIST 1907.

P. Blackiston's Sons & Co., Phila.

This publication is undoubtedly sufficiently well known to the medical profession as to need little comment. Some systematic method of keeping records such as this book offers is practically indispensable to the busy practitioner.

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Vol. XVII. (New Series. Vol. III., No. 2.) February, 1907. No. 1

A SYNOPSIS OF THE WORK OF THE MILK COMMISSIONS OF THE UNITED STATES.

The establishment of milk commissions in the United States began practically with the new century.* Medical Societies recognizing that the heavy infant mortality among bottle-fed babies must be largely due to impure milk took this method of securing a supply which could be guaranteed as being produced from healthy herds under proper conditions and kept clean and pure throughout its progress from producer to consumer.

As public interest has gradually been drawn to impure milk and as bacteriological methods for the detection of such milk have been developed and improved, Commissions have

*A reply from the Essex County Milk Commission, Newark, N. J. was received too late to be summarized, all copy then being in the hands of the printer. The Essex County Commission was organized in 1893, and is undoubtedly the original commission. Its officers have copyrighted the term "Certified Milk," but offer it for use by any medical milk commission organized to influence dairy work for clinical purposes.

been established all over the United States, the majority within the last two or three years.

Recognizing the importance of the work of the Milk Commissions and realizing that a more general knowledge of the methods employed and the results obtained would be of interest to the readers of this Journal and it is hoped, a benefit to the Commissions, it occurred to the writer to send out a circular letter to the various commissions asking for information regarding their work.

The topical heading of the summary which follows indicates the nature of the questions asked. These questions covered not only the work of the Commissions but also asked for their opinion on various matters pertaining to pure milk.

Of 20 Commissions addressed 11 answered satisfactorily (see list on page 141) and to them are due our acknowedgements for responding promptly and fully to the questions submitted.

The Commission of the Academy of Medicine of Cincinnati has recently sent out circular letters suggesting a conference of Milk Commission delegates at Atlantic City in June at the time of the American Medical Association meeting (see page 152). Such a meeting should be productive of much good in securing uniformity of methods, in encouraging the establishment of other commissions and in furnishing for such future commissions a basis for action.

B. R. RICKARDS.

Summary of Replies.—[All replies received to the circular letter were forwarded to Dr. H. W. Hill, Associate Editor who compiled the following summary. In the list of commissions given below the name of the official giving the information,—usually the Secretary is inserted after the name of the Commission.]

The following Milk Commissions sent in replies to the questions.

The Milk Commission of the Oakland Home Club, Oakland, Cal., Dr. Sarah L. Shuey, 952 14th street, Oakland, Cal.

Cambridge Medical Improvement Society, Cambridge, Mass., Dr. Albert P. Norris, Massachusetts avenue, Cambridge.

Academy of Medicine of Cincinnati, Cincinnati, O., Otto P. Geier, M.D., 124 Garfield place, Cincinnati, O.

City of Cleveland, Cleveland, O., G. W. Moorehouse, 1110 Euclid avenue, Cleveland, O.

Syracuse Academy of Medicine, Syracuse, N. Y., Dr. A. C. Mercer, 324 Mongomery street, Syracuse.

Milwaukee Medical Society, Milwaukee, Wis., Dr. A. W. Myers.

Monroe Company Medical Society, Rochester, N. Y. (Formerly of the Rochester Academy of Medicine), Dr. G. W. Goler.

Elmira Academy of Medicine, Elmira, N. Y., Dr. C. W. M. Brown, Elmira, N. Y.

Suffolk District Medical Society, Boston, Mass., Dr. Wilder Tileston, 117 Beacon street, Boston, Mass.

Medical Society of the County of Kings, Brooklyn, N. Y., Harris Moar, M.D., 360 Park place, Brooklyn, N. Y.

Medical Society of the County of New York, New York City, N. Y., Dr. Rowland Freeman.

Several other commissions replied, but in such a manner that the information could not be used in this compilation. In one case, certification had ceased, the only dairy which had come under the supervision of the Commission having operated at a loss. In this case, the initial expenditures for the dairy, which was organized and instituted solely for the production of high grade milk, had been made on a scale too ambitious considering the available local market. This was combined with a low price (10 cents per quart) for the certified milk and resulted in failure.

Organization.—The 11 commissions reporting consisted

of committees appointed by medical societies in 8 instances, the remaining 3 by a private club; a medical society, cooperating with a business men's club; and a regular medical society, cooperating with a Homeopathic Medical Society and the Chamber of Commerce.

Funds.—Nine reported: The funds of one came from the medical society alone; two, from sale of caps alone; two from the medical societies and dairies; one from private subscriptions and sale of caps; one from a bottle tax; one from the dairymen, and one from the Health Department.

Date of Organization.—All reported: One organized in 1900; one in 1901; three in 1902; two in 1904; one in 1905; three in 1906.

Date of Beginning Operation.—Ten reported: One began operation in 1900; one in 1902; one in 1903; two in 1904; two in 1905; two in 1906; one in 1907.

Annual Cost.—Eight reported: Two stated cost as negligible or none; one reports $900 (one dairy supervised); one, $1,800 (two dairies supervised), one $4,000 (eight dairies supervised), one $3,000 (19 dairies supervised); one, cost borne by producers; one, not yet known (began operation Feb., 1907). It is evident that the answers in most cases related only to the cost to the Commission. Thus in one case reporting "none," the Health Department bore all expenses. Moreover, the cost to the Commissions did not in all cases cover total cost, inasmuch as a certain amount of the work done in some cases at least was volunteer.

Number of Dairies Supervised.—All reported: Seven supervised for certification 1 dairy each; one, 2 dairies; one, 8 dairies; one, 19 dairies; while one supervised 1 for certification, 1 for inspection; this latter commission expects soon to add two more dairies to its list.

Forms of Examination for Certification.—All reported bacteriological tests, chemical analyses and inspections as the bases of certification.

Number Samples Analyzed for Certification.—Six reported: Per dairy, one examined 12; one, 20; two, 24; one, 48, and one 50 samples annually. (One having 19 dairies, reported 52 samples examined. This probably means 52 per dairy.)

Total Output.—Two reported: One, from one dairy only, reported 365,000 quarts as annual sales. One, from two dairies, reported one dairy "certified milk" 190,000 quarts, one "inspected milk" 100,000 quarts.

Grades Recognized.—All reported: Nine concern themselves with "certified milk" only; two, with both "certified" and "inspected" milk; one of the nine, however, lends its approval to "inspected milk" supervised independently by the municipality.

Attitude of Dairies.—All reported: Four reported attitude as friendly; three, as "privately opposed," "critical," "antagonistic;" two as indifferent; two reported that those dairies concerned were friendly, implying that others were at least critical. It was not always clear from the replies whether those responding had in mind chiefly the attitude of the dairies under supervision for certification or chiefly the dairies which were not "within the fold."

Attitude of Public.—All replied: Seven reported attitude as "friendly," "appreciative," "absolute confidence," "patrons enthusiastic," etc. Two reported indifference, two did not know.

Profitable to Dairy.—All replied: Three reported flatly "yes;" two reported "yes, on a large scale," and "yes, in connection with ordinary milk;" one states that certified milk is "said to be" profitable; one that the producers have asked for a raise in price (present price in this case per quart 15 cents, per pint 8 cents to consumers, as against ordinary milk per quart 7 cents). Two report that it is too soon to say (neither of these commissions has yet run for one full year) and two state flatly that it is unprofitable. One of those

reporting that certified milk is profitable adds a note that inspected milk has not proved profitable so far.

PRICE OF CERTIFIED MILK AND ORDINARY MILK.

To Contractors.

	1	2	3	4	5	6	7	8	9	10	11
Ordinary Milk per Qt.	6¼	4	3¾	3–4	?	3–4	3½–4	—	—	2¾	3
Certified " " "	......	......	......	......	......	9	....	...	...	6*	......

*At farm, contractor supplying container, transportation, etc.

To Consumers.

	1	2	3	4	5	6	7	8	9	10	11
Ordinary Milk per Qt.	9–10	8	6	7	5–6	6	8	5–6	8	6–8	8
Certified " " "	12	10	14	15	12	12	10	8	20	12	15-20
" " " Pt.	7½	......	......	......	......	......	......	......	......	.....	....

In 1 and 10 the low price is loose milk, the high is bottled.

Bacterial Samples, How Collected.—Nine reported: Four secure the original package itself (i. e. a bottle) put up by the producer; one collects in sterilized plugged test tubes from the original package, the test tubes standing in iced water in a copper case. One collects the original package or transfers the milk to a sterile glass stoppered bottle. The remaining three answers to this question were obscure.

Chemical Samples, How Collected.—Methods identical with those for the bacterial samples were followed apparently in all cases, except that where the test tube was used for the bacterial sample, an 8-ounce rubber stoppered glass bottle was used for the chemical sample.

Samples Collected By.—All reported: Three have hired agents; three collect through the Health Department or municipality; three collect directly through the chemist or bacteriologist of the commission; one through the chemist bacteriologist or secretary of the commission; one states that the bacterial samples are bought at the store, the chemical samples "left at the chemist's house" (presumably by the producer or dealer.)

Reports Made To.—Nine reply: Seven commissions receive the reports direct, or through their secretaries, one through the Health Department, and one through its inspector.

Time of Collection.—Ten report that the samples are secured at the time of delivery to the consumer; i. e. from delivery wagons, during delivery, or from consumer immediately after receipt. One reports "from stores," occasionally from "farms."

Collector's Salary.—Seven report: One, using a hired agent, pays $1.00 per sample; two, collecting through their own bacteriologist or chemist, $5.00 per sample (but this probably includes the analytical fee); two report no fee, but these collect through the bacteriologist or chemist and the analytical fee includes collection; one, collecting through the city inspector pays no fee, and one retains at annual salary (not stated) one person who collects, examines and inspects, giving whole time.

Number of Inspections of Dairies.—Seven report: Six make monthly inspections; one irregular inspections.

Temperature Limit for Milk.—All report: One, below 60 degrees F.; six, below 50 degrees F.; two, below 45 degrees F.; one below 40 degrees F.; one below 35 degrees F.

Inspections Made By.—All report: Seven employ their own veterinarian or inspector (in two of these cases, the veterinarian is also the bacteriologist and in one case, local and State authorities also make veterinary inspections); one has the services of a volunteer veterinarian; one, of the State veterinarian. Two report inspections by the commission, assisted in one instance by the Board of Health, in the other by the City Inspector.

One states inspector's salary as $90 per month for whole time. In other cases, part of the time of the inspector only is employed in inspections and the pay of those not volunteer or already on salary is made per inspection. Three only

state the payment, these giving $10.00 per visit; two adding expenses also.

Tuberculin Test Required.—All Report: All require a tuberculin test; two require annual tests of the whole herd; one semi-annually; the others state no specifications on these points. All (naturally) require tests on new cows added to the herd. One adds that $2.00 per cow is charged for the test, paid by the producer.

Chemical Tests Required.—Nine report: (For convenience in record, numbers have been used to designate the test as follows: Fats 1, tot. solids 2, specific gravity 3, acidity 4, preservatives 5, sed. 6, ash 7, proteids 8, sugar 9, solids not fat 10, color 11, temp. 12, taste 13, salts 14.)

No. 2=1 and 2.
3=1, 2, 3, 4, 5, 6.
4=1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14.
5=1, 2, 3, 4, 7, 8, 9, 12.
6=1, 3, 4, 5, 7, 8, 9.
7=1, 2, 10.
8=1, 2, 3, 5, 7, 8, 11.
9=1, 7, 8, 9.
10=1, 5, 6, 12, 13.
11=1.

Chemical Tests By.—Ten report: Seven employ part time of chemist; one secures analyses through the Municipal Milk Inspector, one through the Health Department. One has the gratuitous services of a volunteer chemist.

Fees.—Ten report: Four pay $5 per sample; one $3.50 to $5 (giving, however, no reason for the variation); one $2 per sample: where municipal officers supply the analyses, the Commissions pay no fee (two cases). One receives gratuitous services; one employs whole time of a chemist, bacteriologist-veterinarian on annual salary.

STANDARDS	1	2	3	4	5	6	7	8	9	10	11
Fat		3.7		4	4.5 3.5	4.5 3.75	3.5	4.5 3.5	*	4	4
Total Solids		13	13								
Solids not Fat			9	12			12.5	13	No St'd	12	
Sugar					4-5				4-5½		
Proteids					3.5-4	3-4					

*1st grade 3.5–4.5   2nd grade over 4.5

Bacterial and Microscopic Tests.—Ten reported: Ten make counts: three examine also for pus; one each examines for gas producers, liquifiers and pathogens; one of these also for blood and streptococci. Four report the medium used, one each using 3 per cent. lactose agar, litmus lactose agar, gelatin-agar and plain 1 per cent. agar. The time and temperature of incubation varies for those reporting. Evidently much requires to be done before this most important part of certification can be considered to be on a definite basis.

Bacterial and Microscopic Tests By.—All report engagement of bacteriologists same as for chemists (see above) with similar fees, except that where the chemist's fee is reported as $3.50 to $5, the bacteriologist's fee is $4.

Bacterial Count Standards.—All report: Nine set limit of 10,000 without qualification for certified milk. One has a winter limit of 10,000, summer limit of 20,000. One of the nine above referred to has also a limit for certified *cream* of 25,000. The Commission which supervises inspected milk as well as certified, limits the former to 60,000 in winter, 100,000 in summer. One requires for certified milk an "average of less than 30,000."

Caps.—All report: Ten use pasteboard caps, six in com-

bination with paraffin, the remaining four using one a parchment ring on neck, one a tin cover, wired to neck, one a tinfoil cover, one waxed paper. Of the six using paraffined pasteboard, one adds a tinfoil cover, one a metal and lead seal, two parchment covers. The tenth commission permits any good method involving double caps. Six apply the caps by hand, one (tin cover wired and sealed) by machine and three do not report on this point.

Opinions, Etc., Concerning Milk Depots.—Five responded: One approved of milk depots; two specified that they should be municipal; two that they should not be municipal and one stating that they should be under a commission. Four believed the educational value very considerable. Only one reported cost of milk depot giving $725 annually, divided into salaries, $500; equipment, etc., $150; rent, $75; this depot sells at 8 cents per quart.

Concerning Pasteurization.—Seven responded: All flatly against commercial pasteurization, two adding that commercial pasteurization had generally proved itself a failure.

Concerning Effect of Commercial Pasteurization on Regulations Relating to Bacterial Counts.—Six responded: Two believing it would have no effect. The question was obviously not wholly understood.

What Shops Should Sell Milk.—Six responded: Four specified merely "clean" or "sanitary" shops; two would restrict the sale to shops for milk products alone. It was suggested that regulations made for milk shops should relate to equable mixing: cleanliness, use of bottles, and low temperature.

Opinions Concerning Municipal Milk Stations.—Five responded: Two approved, two condemned, and one approved, but "not at present time."

Legislation Most Needed.—Four responded: Protection of the term "certified" as applied to milk; a general bacterial limit of 500,000 bacteria per cc.; preventing bottling

of milk from delivery wagons on street; tuberculin test; temperature limit of 50 deg. F. for milk; a general bacterial limit of 100,000 bacteria per c.c.; and state inspection of dairies, with state action against tuberculosis in cattle, were suggested.

Is the Term Certified Milk Protected Legally?—Ten responded: Four stated that it was not protected in either municipality or state; three, that it was protected in the state; three, that it was copyrighted. The protection other than copyright consisted in one case of a law against falsely using the caps of certified milk bottles; in the other, of a law that certified milk must bear the certification of a county medical society, organized under the state medical society.

Is General Inspection by a Central Authority Advisable?—Six responded: Three, yes; one, yes, but not now; one, no, suggesting that the authorities of the municipalities whose jurisdiction overlapped should agree to delimit the areas amongst themselves. One thought that the state and the cities concerned should do this work.

The Scope of Milk Commissions.—Eight responded: One stated that the true function of a milk commission was to bring together the best city trade and the best producers, and to make clear to the former the worth and care taken by the latter. All the remaining agreed that certification was the proper duty of the commission. General improvement of the supply was regarded by two as a function, but by two as only an incidental; two stated that general improvement was not yet a function, while one stated that it was a municipal function, not a commission function. The operation of milk depots was considered in four replies only, one stating that it should be a state, the second a municipal, and the third a milk commission enterprise, the fourth merely answering "no." The popularization of clean milk was accepted in nine replies as properly within a milk commission's scope.

In considering the status as shown in the above tables of milk commissions' work in the supervision of dairies attempting to produce "certified milk," anyone must at once be struck by: 1st—The amount of work and thought gratuitously given by the milk commissions for the purely altruistic purpose of benefiting the health of the community; 2nd—The large percentage of commissions organized wholly by physicians; 3rd—The encouraging fact that co-operation with business men and with private individuals has been secured in some instances at least; 4th—The peculiar difficulties which altruistic bodies of this character meet in endeavoring to achieve as a main object that improvement of milk desired, and at the same time to satisfy the unaltruistic business instincts of the milk dealer and of the consumer, to each of which the sanitary quality of the milk is too often an incident rather than an end; 5th—The fact that, notwithstanding the apparent impossibility from an *a priori* standpoint of achieving anything, the milk commissions as a rule have achieved success in most, and unqualified success in some, cases; 6th—The wide variations in the expense to the commissions of certification, including analyses and inspection of dairies; 7th—The wide variations in the methods used in the basic analysis, i. e., the bacterial count. While the bacterial standard numerically is pretty generally accepted as 10,000 per cc. on delivery to the consumer, the variability of the techniques reported in the above tables in determining the count in individual cases is so great that in fact the standard varies in different places. For instance, if one medium and set of conditions are used in one place for determining the bacterial count, a 10,000 limit being set, and in another place the medium and conditions accepted are sufficiently different from these to give a count only half as high from the same sample, obviously the latter place, if nominally working to a 10,000 limit, is actually working on a 20,000

limit, *as compared with the first place.* Or, conversely, the first place is working on a 5000 limit, if the second place be taken as the standard. The peculiarity of this instance of lack of uniformity is that it is permitted to exist and to continue not in the non-essential but in the case of the *basic standard* on which the whole movement for sanitary milk is founded.

As has been pointed out many times heretofore, the chemical tests, which have been worked out to near perfection in the course of many years experience in many laboratories, are so closely uniform as to permit comparison of the results in one community with those in other communities. But the chemical analysis supplies merely the anatomy of the milk. Its physiology, so to speak, its ability to act as a suitable nutriment, while based of course upon its anatomy, is really decided by the bacterial test. The chemist decides mechanically the bald ratios of the various necessary ingredients constituting the milk. The bacterial tests decide whether the milk itself as a unit is fit for consumption. The chemical test decides if the cows are giving sufficiently rich milk in the first place, and if the producer or handler has added to or substracted from the original product. His tests affect the question of whether or not the consumer is getting full value for his money, in fat, sugar, etc. The bacteriologist decides whether the mixture of fat, sugar, etc., has been so produced and cared for as to furnish a sanitary article of diet.

8th—The uniformity of the opposition to pasteurization is striking, as well as the variety of ideas stated in reply to other questions.

9th—In the details of bottling, caps, seals, etc., great variation is found, but uniformity in these is not so essential as in certain other matters.

We cannot forbear to publish here the circular letter of the Milk Commission of the Academy of Medicine of Cin-

cinnati, kindly forwarded to us by the secretary. The purpose of such a meeting of milk commission delegates is an excellent one and should result in unifying, simplifying and making more easy the operation of those in existence and the inauguration of new ones. It does not seem that such a meeting could well decide upon the technical details of the bacterial examinations, however.

(Circular letter of Milk Commission of the Academy of Medicine, Cincinnati.)

Gentlemen:

Ever since the organization of this Commission, we have been making a rather exhaustive inquiry into the workings of the various Milk Commissions throughout the country. Our circular letter of detailed inquiry has met with a hearty response on the part of the various commissions and these tabulations assisted us very materially towards a prompt and proper organization.

The fact stands out most strongly, however, that a great lack of uniformity exists as to the character of organization; method of supervision; chemical and bacteriological standards (qualitative as well as quantitative); and the necessary technique; the appointment of experts; the relation of veterinarians to Commissions in the testing of herds, etc.

A very great diversity of opinion is shown as to the methods of bottling, capping and sealing of bottles; the pros and cons of the milking machine; obtainable results; hospital milks, etc. An equal variance is shown likewise in the cost of certification to the dairymen.

Our correspondence brings out the pleasing fact that the men who are doing this work are enthusiastic in their efforts for clean milk in our large cities and that they will not rest satisfied with the certification of a limited supply of milk. It

would seem possible to extend their influence and that a concerted effort on the part of all Milk Commissions would do much towards solving this most serious problem of raising the quality of the general supply.

It appears to us therefore, that a meeting of all Milk Commissions of the country for the discussion of the various phases of their work, the interchange of views, and the possible end of forming a national organization, would be productive of very excellent results.

A general standardization of our individual standards would result and we would be in a far better position to present the problem to the profession and laity in a more definite and practical form. Not the least good that might be accomplished by such conference would be to place within the reach of any medical society, considering the formation of a Milk Commission, a simple and well-defined plan of procedure.

While we would be delighted to have such a meeting held at Cincinnati, should such a plan prove feasible, a conference called at Atlantic City during the coming meeting of the American Medical Association in June, might be much more largely attended and results correspondingly better.

We are now communicating with the various commissions of the country and would ask you first, what you think of the plan, second, whether your commission would send accredited representatives to such a meeting, and finally, what your suggestions would be as to the best time and place for such a meeting.

(*Signed*) Yours truly,

The Milk Commission of the Academy of Medicine.

OTTO P. GEIER, M.D.,

Secretary.

The Laboratory Section of the American Public Health Association appointed one and one-half years ago a committee to standardize bacteriological and microscopical milk methods. Reorganization was effected at the December meeting, 1906, and the committee now consists of Prof. H. L. Russell, Dean of the Agricultural College, Wisconsin, Chairman; Dr. F. H. Slack, of the Boston Board of Health Laboratory; Dr. W. H. Park, of the New York Board of Health; Dr. E. C. Levy, Health Officer, Richmond, Va.; Prof. C. E. Marshall, Michigan Agricultural College, and Prof. F. C. Harrison, McGill University, Montreal.

This committee is now actively engaged in the technical procedures and standards which should be followed and will report at Atlantic City at the meeting of the American Public Health Association in September.

H. W. HILL.

THE REORGANIZATION OF THE DEPARTMENT OF PUBLIC HEALTH AND CHARITIES OF THE CITY OF INDIANAPOLIS.

The organization of the Department of Public Health and Charities of the city of Indianapolis, as it is at present conducted, consists of three Health Commissioners and a Secretary who is the Health Officer and Executive Officer of the Board, a chief clerk of Vital Statistics, with three assistants, a telephone operator, and a stenographer.

During the last Legislative session, a law was passed increasing the Board to four members, not more than two of whom shall be of the same political party and rotating their time of service so that in event of a political change of administration, the incoming Mayor can only appoint one member during his term of office. The Secretary of the

Board, the Superintendent of the City Hospital, and the Superintendent of the free Dispensary can be removed for cause only, and upon a trial being given by the Board.

This law takes the Department of Public Health out of politics, a condition very necessary to the proper conduct of such an important branch of municipal administration. The law goes into effect June 1, 1907.

The sanitary department maintains fully-equipped laboratories, both Chemical and Bacteriological, each in charge of competent persons. The city has been divided into ten sanitary districts, each in charge of a sanitary inspector. These inspectors are required to wear a uniform which consists of a blue sack coat with plain brass buttons, trousers to match, a police sergeant's cap with a shield having upon it the words "Sanitary Inspector" and the number of the inspector. They have police powers and wear a regular badge.

The roll is called at 8 A. M. and 5 P. M. each day, and each hour during the day the inspectors must call the Department by telephone from their respective districts, for orders, the telephone operator noting the time of such calls upon a special form. Each district has a complaint book in which complaints are entered as reported and given to the inspector when he calls by 'phone. A supply of quarantine cards, etc., is kept in each district so that it is not necessary for the inspector to return to the Department except at the close of day for roll call. The inspectors serve thirty days in a district and then change. This equalizes the work, as in some of the districts the work is heavier than others.

In addition to these inspectors, we have two milk and dairy inspectors, a food and assistant food inspector who are veterinarians and a disinfecting corps. We have found that since we have established the force on a semi-military basis, the duties are better and more quickly performed; and, as each inspector is judged by the number of complaints com-

ing from his district, he naturally tries to make as good a showing as possible.

EUGENE BUEHLER, M. D.

Indianapolis.

PRESENT STATUS OF MORPHOLOGICAL TYPES OF *B. DIPHTHERIAE*.

So many requests have been received by the American Journal of Public Hygiene for reprints of the Report of the Committee on Diphtheria Bacilli in Well Persons (this journal, July, 1902) or other material which figure Wesbrook's types of *B. diphtheriae*, that we have decided to reproduce the plates accompanying the report together with the summary tables (P. 96 and 97 of July, 1902), in actual figures and in percentages. Dr. Wesbrook has very courteously waived any objections which he might have to this forestalling of further reproduction of the plates elsewhere. The difficulty of securing accurate reproduction of the varying and variable tints of the actual colors has resulted in a decision to print in black and white only, indicating the coloring in footnotes.

Since some unwarranted confusion arose at the date of original publication ("Varieties of *B. diphtheriae*," Wesbrook, Wilson & McDaniel, Trans. Association American Physicians, 1900) concerning the exact nature of the original claims as to the significance of these types, it is well to re-state now the statements then made to the effect that the types figured were drawn up and designated in order to supply a definite and fairly exhaustive morphological nomenclature for the numerous and confusing variants of *B. diphtheriae* constantly found in cultures, for which theretofore incomplete and clumsy descriptions only had existed.

It must be understood that the figures given are types and types only. Just as the types of human faces may be divided into Caucasian, Negroid, Mongolian, etc., and these again subdivided, so the morphological types of diphtheria bacilli may be divided and subdivided.

The original publication of these types resulted in an immense advance in the practice of the bacteriological diagnosis of diphtheria because bacteriologists, provided with a definite nomenclature and a standard set of figures representing the types, were able to compare results with an accuracy before impossible. The discussion precipitated by this publication resulted in renewed investigations, of which that of the Committee of the Massachusetts Association Boards of Health on Diphtheria Bacilli in Well Persons was perhaps the most extensive co-operative investigation ever made on the subject. As a result of these investigations the dictum was reached that the types A, C and D were those on which alone a diagnosis of diphtheria could be safely based, notwithstanding that other types may be occasionally isolated in a virulent condition. In other words, a report of "positive," in ordinary practice, should rarely be given from the microscopic examination of nose or throat cultures on Loeffler's blood serum, incubated at 37 degrees C. for 12 to 24 hours, and stained with Loeffler's methylene blue unless A, C or D, irrespective of associated types, be found present.

The practice as formulated in the Boston Board of Health Laboratory during the years 1900 to 1903 and since followed with marked success may be thus summarized:

1. Diphtheria bacilli reported *present* means that types A, C or D were found, irrespective of presence or absence of associated types.

2. Diphtheria bacilli reported *absent* means absence of A, C or D; and of A1, A2, B1, B2, C1, C2, and E; but irrespective of presence or absence of remaining types.

3. *Atypical* organisms reported *present,* accompanied by request for another culture (i. e., a "doubtful" diagnosis) means that A1, A2, B1, B2, C1, C2, or E were found, but not A, C or D: and irrespective of the presence or absence of the remaining types.

It is to be noted that this formulation was intended simply as a translation of the known facts concerning diphtheria bacilli into terms suitable for the routine cultural diagnosis of diphtheria. It was not intended that the types from E1 to G2 should be excluded from the term diphtheria bacilli in the botanical or systematic sense. Indeed, conclusive proof has been furnished by Wesbrook, Wilson and McDaniel that these types are to be found associated with the larger forms in almost all pure cultures of virulent diphtheria bacilli; and their development from and into the larger forms has been traced and figured in the Boston Board of Health Laboratory by actual continuous microscopic observations of individuals in the process of growth. These smaller types, when found unaccompanied by A, C or D, under the conditions of the regular routine cultural diagnostic service, can and should be disregarded, however, since experience has shown that the rare error so introduced is practically negligible, while if reported as diphtheria bacilli, because of their botanical relationships or because very exceptionally such forms may be virulent, the enormous error introduced daily in actual practice would eliminate cultural diphtheria diagnosis from the list of practical diagnostic utilities. In our judgment it is better occasionally (once or twice a year) to report negative on a culture from a positive case, as may result from following the above rulings, than to report daily a large percentage of positive results on cultures from negative cases, as will inevitably follow the recognition of the minor types as significant.

It is worth while perhaps also to note the Boston Lab-

oratory rulings as to the significance of A, C and D when reported present. Diphtheria is a disease, and if the person showing A, C or D is *well*, they have no disease, and therefore no diphtheria. On the other hand, while it is possible that a patient having a sore htroat, and showing also A, C and D, may not be suffering from the action of the diphtheria bacilli found, but from the action of some associated organisms, such as may produce sore throats in the absence of diphtheria bacilli, yet experience shows that the combination of sore throat and diphtheria bacilli almost invariably means that the disease of diphtheria is present; and that the burden of proof rests with those who would show, in any given case, that such evidence should not be treated as conclusive. Hence in practice, the finding of A, C or D disease of diphtheria as well as infection, while the finding in a culture from a sore throat (or nose) predicates the of these same types in a really well person proves infection only. In such cases the infected person may or may not develop the disease later.

Summary.

1. The disease, diphtheria, is a localized infection with systemic poisoning, due to the toxins of a specific bacterium, *B. diphtheriae.*

2. In a majority of cases, the peculiarities and history of the local lesion combined with the peculiarities and history of the systemic poisoning, permit a *post facto* diagnosis of diphtheria on clinical grounds alone, and form a full resumé of the completed case. Such a diagnosis would be of little value in practice, from the therapeutic standpoint.

3. In certain typical cases, a fairly definite diagnosis may be made from incompletely developed symptoms, local and systemic, on clinical grounds alone.

4. In light cases or the early stages of many severe

cases, a diagnosis of any degree of finality is usually impossible.

5. In certain severe cases of infection by other bacteria, resemblances in the clinical symptoms to those yielded by certain clinical types of diphtheria prevent a conclusive clinical diagnosis.

6. Since diphtheria is due to the diphtheria bacillus, it is natural and proper to determine the presence or absence of this organism in all cases of light or early, or severe atypical cases, not alone for the sake of diagnosis but as an indication also of the protective measures which should be taken both for the patient and for the patient's associates.

7. The established cultural method of searching for diphtheria bacilli furnishes the best known procedure for such purposes.

8. The findings must be interpreted in consonance with all that is known of the disease and of the bacterium in question. Rule of thumb interpretation will give rule of thumb results only.

9. To interpret a bacteriologist's report, if "diphtheria bacilli" are recorded as present, it is necessary to know if the term diphtheria bacilli be used to include all (or certain) merely botanical members of the diphtheroid group, or is restricted to those of significance in diagnosis (A, C or D).

10. If A, C or D be found together with local lesions, it is proper to assume that the symptoms, local and systemic, that the patient presents are due at least *in part* to these types, and that treatment and precautions should be taken as for an established case of diphtheria.

11. If the types A, C or D with or without the doubtful or negative types are not found on the first examination, it is to be remembered that human agencies are always liable to error, and if the clinical conditions justifying the first culture continue or develop, a second culture should be

TABLE I.

Showing Persons Infected with A, C, D ("Typical *B. diphtheriæ*").

	Ontario.	Newton, Mass.	Willard State Hospital, N.Y.	Brookline, Mass.	Springfield, Mass.	Washington, D.C.	Lowell, Mass.	Waltham, Mass.	Providence, R I	Boston, Mass.	Total in East.	Minnesota. Bethany Hospital	Old Ladies' Home	Owatonna.	Red Wing.	Catholic Orphan Asylum.	Park Rapids School.	Total in Minnesota.	Grand Total.
Nose only																			
A	0	0	0	0	0	0	0	0	2	2	4	1	0	1	0	0	1	3	7
C	0	0	0	0	0	0	0	0	2	2	4	0	1	1	0	0	0	2	6
D	0	0	2	0	0	0	1	1	0	8	12	6	0	2	0	0	6	14	26
A, C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
A, D	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	2
C, D	0	0	0	1	0	0	1	1	0	1	4	2	0	1	3	1	2	9	13
A, C, D	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	0	0	6	6
Total nose only	0	0	2	1	0	0	2	2	4	13	**24**	11	3	6	5	1	11	**37**	**61**
Throat only.																			
A	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	3
C	0	0	0	0	0	1	0	0	0	2	3	0	0	0	0	0	0	0	3
D	0	0	0	0	0	1	0	0	0	2	3	1	1	0	3	1	2	8	11
A, C	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
A, D	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	1	1	3
C, D	0	0	1	0	0	0	0	0	0	1	2	2	0	2	1	0	0	5	7
A, C, D	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2	0	2	7	7
Total throat only	0	0	1	1	0	2	0	0	0	10	**14**	4	2	3	6	1	5	**21**	**35**
Nose and Throat.																			
A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	2	3
D	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	3
A, C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A, D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C, D	0	0	0	0	0	0	0	0	0	0	0	4	0	1	3	0	0	8	8
A, C, D	0	0	0	1	0	0	0	0	0	0	1	2	0	1	8	0	1	12	13
Total nose and throat	0	0	0	1	0	0	0	0	0	4	**8**	6	0	4	11	0	1	**22**	**27**
Grand total (A, C, D)	0	0	3	3	0	2	2	2	4	27*	**43**	21	5	13	22	2	17	80	123
Reported positive	0	0	3	3	3	50*	3	3	84*	9					not	giv	en		
Total persons examined,	50	63	82	129	185	221	250	297	927	832	**3,096**	102	42	247	382	65	316	**1,154**	**4,250**

* The Providence results show particularly well how varied the numbers reported as "positive" may be according to the types regarded as important. Thus on the bases of the committee's belief that A, C, D, should be considered chiefly or solely, Providence, would show .43% positives. If all granular and barred but not solid forms be included, as Professor Gorham, of Providence, states there would be about 3% positives. If all forms be included, there would be about 25%. The number actually reported makes about 9%. In Washington the positives formed .9% on the committee's standard; but 22% were actually reported positive. In Boston, on the committee's standard, 3.02% were positive; but only 1% were so reported.

PLATE I.

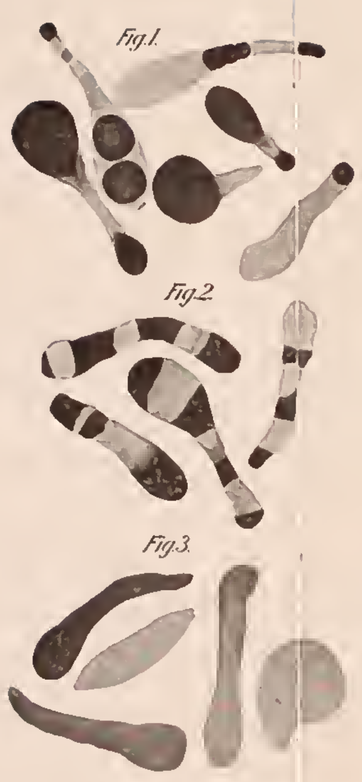

Fig. 1. Type A. 1 to 2 μ thick, 3 to 6 μ long.
Fig. 2. Type A[1]. 1 to 2 μ thick, 3 to 6 μ long.
Fig. 3. Type A[2]. 1 to 2 μ thick, 3 to 6 μ long.

The granules in A (Fig 1) are reddish.

(This and the following plates represent, in black and white, *B. diphtheriæ* from serum cultures, twelve to twenty-four hours old stained with Loeffler's methylene blue. The reddish tint of the granules in types A, C, D, E, F, and G, noted under their respective figures, is an example of the metachromatism, well known as occurring in *B. diphtheriæ*, and certain other bacterial species. The plates are here reproduced, with the courteous permission of Dr. Wesbrook, from his original colored drawings. Colored reproductions are given in the Trans Amer. Phys. 1900 and the Report of the Minnesota State Board of Health, 1899-1900.)

PLATE II.

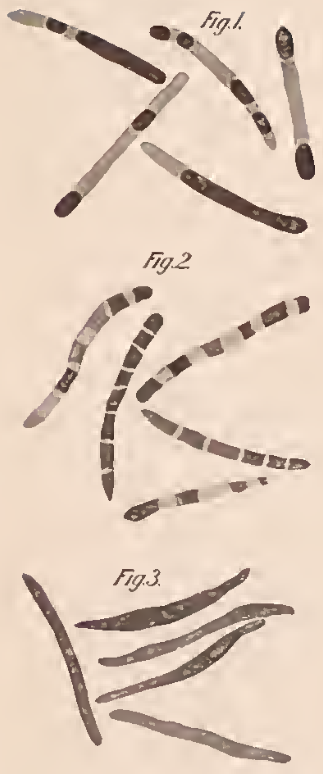

Fig. 1. Type B. 0.5 μ thick, 3 to 7 μ long.
Fig. 2. Type B[1]. 0.5 μ thick, 3 to 7 μ long.
Fig. 3. Type B[2]. 0.5 μ thick, 3 to 7 μ long.

The granules in B (Fig 1) are dark blue.

PLATE III.

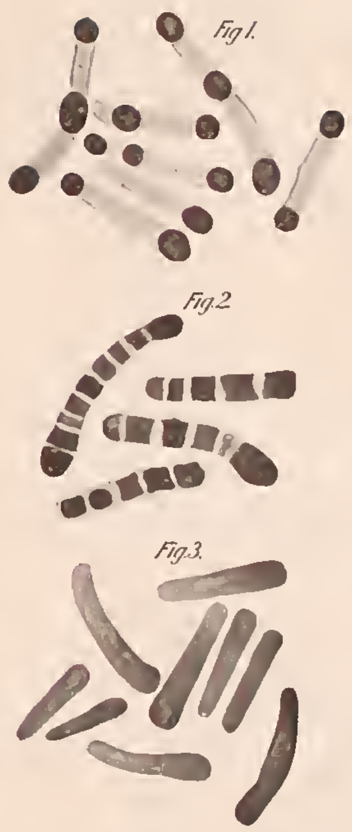

Fig. 1. Type C. 0.5 to 1 μ thick, 3 to 6 μ long.
Fig. 2. Type C[1]. 0.5 to 1 μ thick, 3 to 6 μ long.
Fig. 3. Type C[2]. 0.5 to 1 μ thick, 3 to 4 μ long.

The granules in C (Fig. 1) are reddish.

TABLE II.

SHOWING PERCENTAGES OF PERSONS INFECTED WITH A, C, D ("TYPICAL *B. Diphtheriæ.*")

	Ontario.	Newton, Mass.	Willard State Hospital, N Y	Brookline, Mass	Springfield, Mass.	Washington, D C	Lowell, Mass.	Waltham, Mass	Providence, R I	Boston, Mass.	TOTAL IN EAST.	MINNESOTA. Bethany Hospital.	Old Ladies' Home.	Owatonna.	Red Wing.	Catholic Orphan Asylum	Park Rapids.	TOTAL IN MINNESOTA.	GRAND TOTAL
Persons examined	50	63	82	129*	185	221	250	297	927	892*	3,096	102	42	247	382	65	316	1,154	4,250
Percentage of total persons infected	0	0	3.66	2.32	0	0.90	0.80	0.67	0.43	3.02	1.39	20.59	11.90	5.26	5.76	3.07	5.38	6.03	2.89
Percentage of persons showing nose only infected	0	0	2.44	0.77	0	0	0.80	0.67	0.43	1.45	.77	10.78	7.14	2.02	1.30	1.53	3.48	3.20	1.43
Percentage throat only infected	0	0	1.22	0.77	0	0.90	0	0	0	1.12	.45	3.92	4.76	1.01	1.59	1.53	1.58	1.82	0.82
Percentage both nose and throat infected	0	0	0	0.77	0	0	0	0	0	0.45	.16	5.88	0	2.23	2.87	0	0.32	1.90	0.63
Percentage of persons showing nose infected with or without concurrent throat infection	0	0	2.44	1.54	0	0	0.80	0.67	0.43	1.90	.93	16.66	7.14	4.25	4.17	1.53	3.80	5.11	2.07
Percentage of persons showing throat infection with or without concurrent nose infection	0	0	1.22	1.54	0	0.90	0	0	0	1.57	.61	9.80	4.76	3.24	4.46	1.53	2.90	3.72	1.46
Percentage reported positive	0	0	3.66	2.32	1.62	22.6	1.20	1.00	9.06	1.01					not given				

* Some cases examined in Boston, Brookline and New York were omitted from this table because of certai omissions in their records.

The records permit, however, their addition here, which would make the percentage as follows: —

Boston: total examined (nose and throat, including 892 given above), 991; total infected (A, C, D), 2.82%; nose only, 1.41%, throat only, 1.01%; both, 0.41%, total persons with nose infected, 1.81%; total persons with throat infected, 1.41%; total reported positive, 10 = 1.01%.

Brookline (exclusive of 129 given above): nose and throat culture in same tube, 687, total infected (A, C, D), 17 = 2.47%; throat only examined, 253; total infected (A, C, D), 6 = 2.37%. All infected with A, C, D, were reported positive.

New York: throat only examined, 201; total infected (A, C, D), 13 = 6.5%. All infected with A, C, D, were reported positive.

The persons examined, as recorded above in the Willard State Hospital, and those given in the foot-note in Brookline and New York, as well as all except the Catholic Orphan Asylum in Minnesota, had been more or less exposed to diphtheria.

PLATE IV.

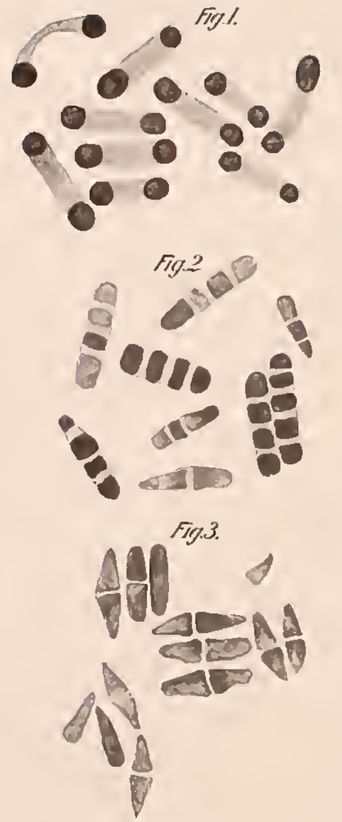

FIG. 1. Type D. 0.75 to 1 μ thick, 2 to 3 μ long.
FIG. 2. Type D¹. 0.5 to 1 μ thick, 2 to 3 μ long.
FIG. 3. Type D². 0.75 to 1 μ thick, 1 to 2.5 μ long.

The granules in D (Fig. 1) are reddish.

PLATE V.

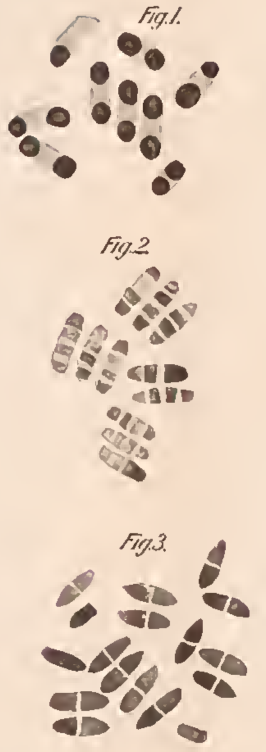

FIG. 1. Type E. 0.5 to 0.75 μ thick, 1.5 μ long.
FIG. 2. Type E¹. 0.5 to 0.75 μ thick, 1.5 to 2 μ long.
FIG. 3. Type E². 0.5 to 0.75 μ thick, 1 to 2 μ long.

The granules in E (Fig. 1) are reddish.

PLATE VI.

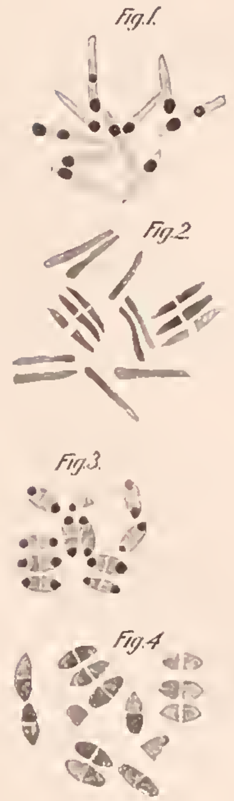

FIG. 1. Type F. 0.25 to 0.5 μ thick, 1 to 2 μ long.
FIG. 2. Type F². 0.25 μ thick, 1 to 2 μ long.
FIG. 3. Type G. 0.5 to 0.75 μ thick, 1 to 1.5 μ long.
FIG. 4. Type G². 0.5 to 0.75 μ thick, 1 to 1.25 μ long.

The granules in F (Fig. 1) and G (Fig. 3) are reddish.

taken, perhaps a third or fourth, until it becomes obvious that the significant types are really not present.

12. Should the doubtful or usually negative types only (i. e., those other than A, C or D) be persistently present in a clearly marked clinical case of diphtheria, the case must be considered diphtheria due to a quite unusual, but not unknown, existence of virulence in these types.

13. Should the continued absence of all types be demonstrated conclusively, the disease, however closely resembling diphtheria, must be set down as not diphtheria.

14. In any case of sore throat, occurring where the prevalence of diphtheria or known exposure suggests the likelihood of diphtheria infection, antitoxin should be used and the patient isolated, pending the bacteriological investigation.

15. Should significant types or "doubtful" types be found in the throat of a well person exposed to infection, the person should be kept under observation and not allowed to expose other persons in public assemblies to infection nor to handle food or drink for public consumption.

16. Should significant or doubtful types be found in well persons known not to have been exposed to infection, they should be warned concerning the possible later development of the disease and concerning the possibility of infecting others, but restrictions can hardly be justified except in the case of milkmen, or others, placed in analogous relations to public food or drink supplies.

Description of Types.

The types are based upon microscopic examination of smears, stained with Loeffler's methylene blue made from cultures grown upon Loeffler's serum, incubated 12 to 24 hours at 37 degrees C.

Seven primary divisions, based on *size* and *shape*, are

recognized. Each primary division is further subdivided into three, based on staining reactions to Loeffler's methylene blue. The plain letters A to G are used for the first subdivision in the respective primary division; A1 to G1 for the second, and A2 to G2 for the third, making 21 individual types in all. The branching type is provisionally placed under A, but not figured in the plates. The system of primary division is based on size, inasmuch as either diameter or length or both progressively diminish from A to G, but shape correlates also with this, and over-rules mere size in classification to some extent. The system of secondary division is based on the reaction between certain portions of the protoplasm with the stain used. Thus the plain letter divisions are all stained uniformly but for the presence of certain more densely stained round or oval granules, approximating the diameter of the cell in which they lie, and, except in one division (B), showing a distinct reddish or purplish tint, in contrast with the blue of the rest of the organism. The second subdivision, designated A1-G1, show alternate bars of light and dark stain placed transversely across the length of the cell, while the third subdivision (A2-G2) are stained uniformly throughout, except that the last four have a single colorless band across the middle. (Note,—F1 and G1 not figured in the plates originally published have since been found in the Minnesota State Board of Health Laboratory.)

The present status of opinion and practice amongst American bacteriologists classes A, C and D as "significant" types, A1, A2, B1, B2, C1, C2, and E as "doubtful," and E1, E2, F, F1, F2, G, G1, and G2 as negligible types, in routine cultural diagnostic work.

H. W. HILL.

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APRIL QUARTERLY MEETING OF THE

Massachusetts Association of Boards of Health.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boylston street, Boston, on Thursday, April 25, 1907, under the Presidency of Dr. Henry P. Walcott.

The reading of the minutes of the January meeting was dispensed with.

The following gentlemen were unanimously elected members of the Association, upon the recommendation of the Executive Committee:

W. A. Graustein, of the Boston Dairy Company.

Dr. Monahan, of the Clinton Board of Health.

Dr. Leon A. Paquin, of the Webster Board of Health.

William M. Campbell, of the Boston Board of Health.

THE PRESIDENT: The first business of the Association will be the paper upon "Pasteurization of Milk," by Dr Lederle, Ph.D., of New York. I now have the pleasure of presenting him to you.

PASTEURIZATION OF MILK

By Ernst J. Lederle, Ph.D.

To ensure the public a pure and safe milk supply should be regarded as one of the most important duties of the health officer, especially in the case of the larger cities.

With the growth of cities the problem becomes more and more complicated. Take New York as an illustration. It is not so very many years ago that its milk supply was derived from near-by farming districts, when a railroad haul of 100 miles was unusual. Today much of the supply comes from points 400 miles distant. It is produced on 35,000 farms, scattered through five different states, passes through 400 creameries and over twelve different lines of transportation. Some of the milk at certain seasons reaches the city from Canada, and shipments of cream arrive daily from Ohio.

One hundred and fifty wholesale dealers are engaged in the business, the retail stores number 12,000 and the daily consumption is 1,500,000 quarts. It is difficult to conceive how an effective official control can be exercised under these conditions at any cost.

In no other city is the problem so complicated, not only on account of its magnitude, but owing to the many sources of supply outside of city or even state jurisdiction.

The first extensive public agitation on the milk question in New York was directed against so-called "swill milk," a protest against the use of improper food for milch cows. Later, when adulteration by the addition of water or the removal of cream, or both, became so prevalent, vigorous and effective crusades were made by the authorities, and these forms of adulteration have been kept in check quite effectually.

Previous to the year 1901 the activities of the New York City Health Department were directed exclusively to the

prevention of adulteration of milk, no particular attention being given to cleanliness, bacterial contents, sanitary condition surrounding the production of the article, its transportation or the condition of the retail stores.

Physicians were then becoming more and more impressed with the necessity of fresh, clean milk and of a low bacteria count for successful infant feeding. Such milk was not yet a commercial product. It could be obtained from a few private dairies only, at a high price and as so-called "certified milk," and was supplied in the form of pasteurized milk by charitable associations, otherwise it was out of reach of the poor of the city.

Dr. W. H. Park, Bacteriologist of the Department of Health, at the request of Dr. Biggs, the Medical Officer, began an investigation of the condition of the milk supply from the bacteriological standpoint, with a view of preventing the excessive and unnecessary bacterial contamination; at the same time, through funds supplied by the Rockefeller Institute for Medical Research, physicians were appointed to determine the influence on the health of infants of the bacteria and their products in commercial milk.

This work also included an investigation at the source of production. The value of this research, which lasted about two years, cannot be over-estimated.

Briefly, the conclusions were as follows:

That the average commercial milk of the city was not a safe food for infants, on account of the very large number of bacteria contained therein.

The principal reasons for this unsatisfactory condition were found to be:

Filthy barns.

Unclean cows.

Improperly cleaned utensils.

Improper cooling of milk at farm.

Long transportation with insufficient ice.

High temperature at which the milk was kept in the retail stores.

While bacteria contaminate milk from the sources described, and increase to enormous numbers under such conditions, causing rapid deterioration of the product, milk is also subject to infection by germs of diseases of which the following are the most common:

Typhoid fever, scarlet fever, tuberculosis and diphtheria.

That this constitutes a real public danger will hardly be questioned. Park says in this connection:

"Every year epidemics occur which have been traced to milk contaminated by ignorant or careless milkmen, who have infected their milk from their own dirty hands or dirty water, or in other careless ways. The extent of this danger may be judged by the fact that there was published in one of the medical journals a report upon 330 outbreaks of epidemic diseases traced to milk; 195 of these were epidemics of typhoid fever, in 147 of which the disease prevailed at the dairy or farm; in 67 it was due to contamination of well water; in 24 employees at the farm were acting as nurses, and in 10 they were working while still sick. There were 99 epidemics of scarlet fever, in 68 of which the source of infection was traced to illness of persons at the dairy; in 17 the employees themselves were suffering from scarlet fever, and in 10 they were acting as nurses to scarlet fever patients. In other cases the infection was through the storage of milk near infected rooms, or the poison was brought by cans or bottles from the patient's houses. There were 36 cases of diphtheria, in 13 of which the disease existed at the farm or dairy. When it is remembered that some of these epidemics have numbered hundreds of cases with many deaths, the great importance of this is apparent and the amount of mischief which is possible through the neglect of a single person seems appalling."

Dr. Harrington, of the State Board of Health of Massa-

chusetts, has recently made public the facts relating to an epidemic of scarlet fever spread through the agency of milk and originating in the person of an employee, whose duty it was to taste milk which came to the dealer from the country.

In the summer of 1903, in the town of Bayside, Long Island, within the limits of New York City, there was an epidemic of typhoid fever, in which 86 persons were effected. Of these 86 persons, 84 were found to have used the milk from one farm. Upon investigation made under my supervision by the Department of Health Inspectors, it developed that two cases of typhoid fever had recently occurred on this dairy farm; that the water from the well and the water from the cistern used for washing the milk cans and milk bottles was contaminated and that undoubtedly the cases of typhoid fever in the village had their common origin and were spread by the milk from this particular dairyman. There is no reason why such conditions may not exist on many farms supplying milk to large cities causing cases of typhoid fever which are difficult and often impossible to trace.

An interesting case of typhoid fever is at present in a hospital of the Health Department of New York City, which may throw new light on the method of spreading this disease. The patient, a woman, a cook by occupation, has infected during the last five years, seven families of the nine she has been serving with, causing 32 cases of the disease, two fatal. She has been under observation for five weeks and is daily passing typhoid germs in the feces. As far as can be learned she has never had the disease herself in a serious form.

What possibilities this suggests of the danger of infection by the hands of milkers. May the milking machine soon come into general use.

Wherever milch cows have been subject to the tuberculin test, a certain proportion have been shown to be suffering

with tuberculosis, from 10 to 40 per cent. in different localities. It must be admitted that in the light of our present knowledge the question of danger of the transmission of tuberculosis through milk is only one of degree, and that proper protective measures must be universally adopted.

The practical results obtained by the New York Department of Health's investigations into the city's milk supply were two-fold:

In 1902 a regulation was adopted requiring that no milk should be offered for sale in the city which was at a temperature above 50 degrees F.; this requirement is now embodied in the sanitary code, is a law and is strictly enforced.

Systematic inspections of conditions surrounding the production of milk in the country was also begun and has been recently very largely extended.

The Milk Commission, a body of physicians appointed by the County Medical Society, adopted a definite bacteria standard for so-called certified milk (containing less than 30,000 bacteria in 1 c.c. milk) and the dairies found on inspection to have complied with the requirements of the commission as to construction of the stable, its cleanliness, the condition of the cows and helpers (freedom from contagious diseases), the bottling of the milk at the farm in a milk house separate from the barn, the proper cleansing and sterilization of the bottles and the maintaining of the bacteria and other standards were entitled to a certification label. Frequent inspections were made of the farms and tests of the milk.

Physicians of the City were sent the names of those dealers who marketed certified milk and also copies of the tests.

The most gratifying results have been obtained by the use of this grade of milk for infant feeding but unfortunately it is beyond the reach of the poor and even of those of moderate means. When commercial milk, such as is dipped from cans in the retail stores, sells at from three to five cents per quart, the certified milk is bringing from twelve to twenty cents; and

even at these prices, with the comparatively limited production the actual producer is dissatisfied with the small profit he claims to be making.

That the public does not sufficiently appreciate the advantages of certified milk is indicated by the fact that while it has been on the market since 1901 the daily supply amounts only to 16,000 quarts in this city, of a total consumption of 1,500,000 quarts, one per cent. of the supply.

During the last two years the activities of the Health Department have been directed more and more to the inspection of the conditions surrounding the production and handling of milk in the country, first attention being given to the creameries. later to the dairy farms. The creameries being owned by the milk dealers and under their direct control were improved as directed by the Department with little delay. The inspection of the farms was soon found to be an enormous task with endless detail and requiring a very large force of help at very great expense. It developed that most of the dealers had little or no control over the production of the milk which they handled and that improvements must be carried out through the individual producers. From a purely legal standpoint, the Department has no jurisdiction beyond the limits of New York City. Practically, control has been acquired for the reason that as no milk can be sold in the city, without a permit from the Department of Health, the threat that a dealer's permit will be revoked if he accepts milk from a producer who is blacklisted, is a rule quite sufficient.

The wide publicity given to the official reports of the inspections made at the creameries and dairy farms and the request for large sums of money for the purpose of enlarging the inspection system has operated to make the discussion of the milk question in our city one of the most active before the public at the present time.

For months our daily press has made it an important news feature. Recently a conference on the whole milk question

was inaugurated by the Association for Improving the Condition of the Poor, at which officials and authorities on pure milk from various cities joined with our experts in a consideration of the many questions involved.

The proceedings of this conference have since been published and the outcome of the meeting has been the formation of a Citizens' Milk Committee and a Milk Commission appointed by the Mayor.

In addition the Board of Aldermen has under consideration an ordinance which would require :—

That all milk and cream which is not produced from herds certified as being free from tuberculosis or as not containing less than 500,000 bacteria in one cubic centimeter shall be pasteurized by exposure for at least twenty minutes to a temperature of 158 degrees F.

We understand that our city fathers have wisely concluded to delay action on this measure until the Mayor's Milk Commission has made its final report and recommendations. As the local health authorities have ample powers to make any regulations that may be necessary to protect the milk supply and as there are a number of men upon their staff who are recognized as leading experts on the subject of milk and its sanitary control, many of us are of the opinion that the adjustment of the whole matter may with safety, be left with that Department.

But the interest taken in the agitation for a cleaner milk supply does not stop with the city. A bill in relation to the pasteurization of the milk supply has been introduced in our State Legislature, the principal provisions of which are:

That all milk brought into New York City should be subject to pasteurization, and that the pasteurization should be carried out under the supervision of the Department of Health.

There is, however, no likelihood of such bill becoming a

law. The state could best aid the city by taking up the question of tuberculosis among milch cows with a view to eradicating the disease at the outset by destroying infected cattle.

The state, through the health officers and the Department of Agriculture, should enforce sanitary regulations on the dairy farms.

The principal features under discussion of how the city milk supply is to be improved are:

Should the system of inspection in the country be increased and if so, can it be entirely relied on to produce a clean and safe milk supply?

Is the pasteurization of milk desirable, and if so, under what conditions?

Should pasteurization be made compulsory?

If pasteurization is approved of, should it, in part, or entirely, take the place of inspection?

Never before has the subject of the pasteurization of milk been so generally discussed. It is unfortunate that many of those who are taking part in the discussions have no clear idea of what the term pasteurization really means, or what effect it has on milk chemically, bacteriologically, physically, or clinically.

Let us try to determine what the phrase "pasteurization of milk" really implies. Sterilized or cooked milk having been objected to by the adult consumer on account of its peculiar, and to many disagreeable, taste; and by most physicians on account of its decreased digestibility when used in infant feeding, experiments were made to reduce the germs in milk, and especially to destroy all disease germs by some other method.

It was necessary that the process should not injure the flavor or seriously impair the digestibility of the product. The most important of such processes is "pasteurizing," originally devised by the scientist, Pasteur, for the treatment of wines. As applied to milk it is usually considered to refer

to the method of heating milk to various degrees for varying periods of time; different authorities giving different directions for special purposes.

Pasteur recommended heating to 158 degrees F. for a short time.

The U. S. Department of Agriculture's (in Standards of Purity of Food Products) definition, is:

"Pasteurized milk is milk that has been heated below boiling, but sufficiently to kill most of the active organisms present and immediately cooled to 50 degrees F., or lower."

L. Emmett Holt, M.D., a noted specialist on infant feeding, described pasteurized milk as being prepared by heating to 150 degrees F. for thirty minutes.

Russell, in his Outlines of Dairy Bacteriology says of pasteurizaton:

"In this method the degree of heat used ranges from 140 to 185 degrees F., and the application is made for only a limited length of time."

Swithinbank and Newman, in their Bacteriology of Milk define it as follows:

"The term 'pasteurization' is now used to designate a process of heating at any temperature between 60 degrees C., 140 degrees F., and 90 degrees C., 194 degrees F. for a short period of time, not exceeding twenty minutes. In practice, the temperature of 75—85 degrees C.(=167 degrees to 185 degrees F.,) is generally adopted. There is no fixed standard for the temperature of pasteurization, except that it must be above the thermal death point of pathogenic bacteria and yet below the boiling point."

W. H. Park, M.D., in Pathogenic Micro-organisms, states:

"It is sometimes undesirable to expose food, such as milk, to such a temperature as will destroy spores, because of the deleterious effects of such high temperatures, and yet a partial sterilization is necessary. Under these conditions we heat the food stuffs for thirty minutes to such a

temperature (158 degrees F.) as will kill the bacteria in the vegetative form, but will allow the spores to remain alive."

As a matter of fact, the methods of pasteurization of milk are continually being modified to conform to more advanced knowledge respecting the destruction of pathogenic organisms or new requirements relating to the condition of milk for infant feeding.

Pasteurization of milk has heretofore been carried out by one of the methods described above, either in the household, in which case the milk is contained in bottles usually of the type of nursing bottles; at infants' milk depots in similar containers, or commercially in bulk by the milk dealers.

This latter method is practised on a large scale in the creameries of Europe, particularly in Denmark and Germany, and to some extent in England. On a visit to Berlin and Copenhagen about five years ago, I found pasteurized milk being used very extensively in those cities and I am informed that pasteurization is required by law in Denmark. In both cities the process used involved the holding of the milk at the increased temperature for at least twenty to thirty minutes.

For some years, a method of heating milk by what was termed "continuous process pasteurization" has come into vogue and has been popularized, especially in this country. This process was particularly welcomed by milk dealers of our large cities on account of its comparatively small cost, rapidity of operation and the good commercial results obtained by it. In New York the strong agitation for a clean milk supply, the lack of control of the sources of supply of the product by the dealers, the lack of official supervision, either municipal or State, the refusal of the dairy farmers to make improvements unless they could obtain a better price for their milk, and the reluctance of the public to pay the dealer an advanced price, all operated to pave the way for pasteurization.

The manufacturers of pasteurizing apparatus, particularly

those who had operated in the European countries, were surprised to find requirements in our milk trade which they were entirely unfamiliar with and which made it necessary to modify their process. They found that here the public demanded, especially in the case of bottled milk, a distinct "cream line." The milk consumer has for years been educated to this phenomenon as a proof of the richness of the milk, and also as evidencing that the bottling had been done in the country, which was considered to be especially desirable. The heating of milk for half an hour at a temperature of 150 degrees F. or over has the effect of either entirely preventing the rising of the cream or of delaying it very materially.

No milk dealer was willing to adopt a process which would spoil the cream line of his milk. To satisfy this objection, the process was modified to what is generally known as "rapid commercial pasteurization" which as now commonly practised is the heating of milk in a continuous apparatus, in which it is exposed for periods of from five seconds to thirty seconds from 140 degrees F. to 165 degrees F. This method of treating milk was adopted by dealers solely for commercial purposes, the advantages being that his losses from sour milk were very much reduced if not done away with entirely.

No special claims were made for this milk by the dealer and in fact it was placed on the market without any label to distinguish it from the regular unprocessed supply. One large firm of our city has been furnishing a high grade bottled milk, "commercially pasteurized" for at least five years.

In the summer of 1906 the Department of Health enacted the following sections of its sanitary code:

"No milk, which has been heated, pasteurized, sterilized or subjected to heat in any manner for the purpose of preservation, shall be received, prepared, held, kept or offered for sale or delivered in the City of New York unless the receptacle in which it is contained bears a label stating plainly the process to which the milk has been subjected."

The dealers as a result of this requirement placed labels reading "Pasteurized" on all cans and bottles of milk which had been treated by any process of heating. It was thought by those who disapproved of pasteurizing that the label requirement would interfere with the sale of this milk, the advocates on the other hand believed that it would encourage its use. As far as we can learn the latter is what has actually occurred.

Let us consider what effect the different degrees of pasteurization have on milk.

The public is so opposed to the cooked or scalded taste of heated milk that this must be avoided in pasteurization of milk for general use. It is claimed that a momentary exposure to 170 degrees F. may be made without any material deterioration of flavor—but a temperature of not over 158 degrees to 160 degrees F. may be used for ten to fifteen minutes.

For an exposure of ten minutes or longer a temperature exceeding 150 degrees F. will entirely prevent or at least seriously retard the rising of the cream. A temperature of 158 degrees to 160 degrees F. may be maintained for a minute without interfering with the creaming property.

I have collected a very large amount of information giving the experiments of many investigators on the thermal death point of the various disease germs which might be found in milk but will not burden you with these details at this time.

You will readily understand from the vagueness of the term pasteurization that we must first agree on some definite time and temperature limits before we can discuss what effect the modes of treatment will have.

For convenience sake we use the term "prolonged pasteurization" when the milk is heated from 20 to 30 minutes to a temperature of from 140 degrees to 160 degrees F. "Rapid commercial pasteurization" to mean heating for one minute to 155 degrees to 165 degrees F.

According to the best authorities the effect on the germs of

diphtheria, tuberculosis, scarlet fever (contagion), and typhoid fever would be by

Prolongd Pasteurization:—

Total destruction of diphtheria and typhoid bacilli, and the contagion of scarlet fever.

As to tubercle bacilli, the lower temperature would usually kill all and always the majority; the higher temperature would invariably kill if the whole milk is uniformly heated.

By Rapid Commercial Pasteurization:—

Such temperature, as a rule, killed all diphtheria and typhoid bacilli and, as far as we know, the contagion of scarlet fever and the very great majority of tubercle bacilli, not more than one in 1000 remaining alive, and even these so crippled as usually not to infect when taken by the stomach.

The effect on ordinary bacteria common in milk is that from 95 to 99.9 per cent. are killed, very few, except spore-bearing bacteria, surviving. The higher temperature destroys only slightly more than the lower, because those remaining alive after heating for one minute to 155 degrees F. are very resistant forms.

The following bacteriological examinations have been made in the course of routine work and illustrate the effect of "rapid commercial" and "prolong pasteurization."

Rapid Commercial.			Prolonged.		
Raw Milk bacteria per c. c.	Pasteurized bacteria per c. c.	Temperature for 30 seconds	Raw Milk bacteria per c. c.	Pasteurized bacteria per c. c.	Temperature for 33 minutes
5,100,000	5,700	158° F.		7,950	148-132° F
7,025,000	45,900	155° F.	896,000	575	152-140° F
3,550,000	68,150	155° F.		525	152-144° F
				150	162-146° F

There has existed in the minds of physicians who have made a special study of infant feeding great differences of opinion in respect to the effect of heat on the digestibility of milk; at present the consensus of opinion may fairly be said to be:

That heating impairs the digestibility of milk, especially if the temperature reached at or near the sterilizing point. In the case of heating at a lower temperature, as in prolonged pasteurization, the effect is much less. There is no data at hand in respect to "commercial pasteurized" milk, but it must be assumed that the effect on the digestibility must be even less than in prolonged pasteurization.

Dr. L. Emmett Holt's published opinion on this point is:

"Heating to 150 degrees F. for thirty minutes does not affect the taste of milk and does not render it more constipating. The unfavorable effects, if there are any, are so slight that they need not deter one from the use of pasteurized milk for infants even for long periods. The preference, however, should always be given to milk which is so clean and so fresh as not to require any heating."

Dr. Joseph E. Winters, another specialist in infant feeding, says of pasteurized milk:

"It is a popular belief that pasteurization makes cow's milk, even if fresh and pure, a more suitable food for infants. This is erroneous; fresh, pure milk is not improved by pasteurization; it is not more digestible, and it is in no way a better food for an infant.

"Does pasteurization deteriorate fresh milk? I have seen scurvy where pasteurized, modified milk had been the only food. Recovery was rapid with the continued use of the same food, raw.

"Fresh, raw milk is superior in nutritive value to that which has been artificially changed by pasteurization."

Should the system of inspection in the country be increased, and if so, can it be entirely relied on to produce a clean and safe milk supply?

All milk should be produced under proper sanitary conditions from healthy animals and the system of official inspection in the country should be carried out to the fullest possible extent.

To those familiar with the whole problem of the commercial production of milk it seems unlikely that inspection alone can ever be relied on to produce a safe supply for large cities. A consideration of the epidemics described above will emphasize the reasons for this conclusion. Who can tell, for instance, when tuberculosis will be eliminated from our dairy farms?

Can we conceive of inspection so thorough and effective as to prevent the spread of typhoid fever and scarlet fever by means of milk? Let us strive for this end, but in the meantime, let us not neglect any steps to insure safe milk supplies.

Is the pasteurization of milk desirable, and if so, under what conditions?

Professor Sedgwick, the eminent sanitarian, in his Principles of Sanitary Science and the Public Health, says:

"Most of the milk sold in Boston is at least twenty-four hours old when it reaches the consumer. Much of it comes by rail from distant parts of Massachusetts, and even from other states. The consumer is, as a rule, totally ignorant of the place of origin of the milk which he buys, and equally so of the conditions, whether wholesome or unwholesome, sanitary or unsanitary, of the farms on which the milk is produced.

"It would be of great advantage to consumers and producers alike if the milk farms tributary to a great city could be visited and inspected; and it would add materially to the keeping qualities of milk (and therefore to its economic value) if it could be carefully pasteurized before beginning its journey to the City.

"Moreover, inasmuch as typhoid fever is often disseminated by milk and there is reason to believe that milk is a vehicle for some other infectious diseases, such as tuberculosis and possibly scarlet fever and diphtheria, pasteurization, which is a safeguard against the conveyance of such diseases by milk, commends itself to every sanitarian.

"Pasteurization also postpones the decomposition of milk and its consequent staleness by destroying germs which produce souring, and thus helps to keep it in this respect nearer to the 'normal' required by infants."

Most of those familiar with the conditions must agree with Prof. Sedgwick in this statement. Pasteurization of milk is desirable whenever the safety of the supply is not assured.

I have recently had occasion to make inquiries as to the cost of pasteurization of milk in bulk and the information obtained may be briefly summarized:

The figures are based on the use of what is called the regenerative system, in which by ingenious arrangement of position, the tubes carrying the incoming cold milk are adjacent to the tubes in which the heated milk flows, the change of temperature resulting, in a very economical operation. Dealers who have used the various systems of pasteurization inform me that the regenerative one can be operated at a cost of about one-third of that of other methods.

The smallest economical plant is one in which 6,000 quarts of milk can be pasteurized at one time, operating continuously for about one hour.

The installation cost with boilers and all attachments is $3,500.

Cost of pasteurizer alone $2,000.

In many creameries where boiler and engine are already installed for other purposes, it is feasible to use the exhaust steam from the engine to obtain the heat for the pasteurizer with no additional expense.

It is estimated that the expense of the pasteurizer would be paid for in the course of about one year, based mainly on the saving from losses of sour milk. The cost of pasteurization by above method (commercial pasteurization) with heating period of about one minute would be one-tenth of one cent to one-quarter of one cent per quart.

In the case of "prolonged pasteurization" with heating period

of about thirty minutes the cost would be about one-half of one cent per quart of milk.

A special machine of this type is now in operation in New York City and tests of its bacteriological efficiency are being made.

The advantages and disadvantages of pasteurized milk appear then to be.

Advantages.

The reduction of the number of bacteria.

The enhancing of the keeping quality.

The destruction of disease germs.

The great benefits derived from its use in infant feeding, in hospitals, infant milk depots and in private practice, will be attested by most physicians.

Disadvantages.

When the temperature used has been high the digestibility of the milk is affected and such milk will not agree with some children.

That milk which would ordinarily not be marketable on account of its age, might be pasteurized and its faults hidden.

That by the destruction of the ordinary acid producing bacteria, nature's danger signal of old milk, the souring process, is interfered with and that more serious changes may take place without the knowledge of the consumer.

It is greatly feared by many that the adoption of pasteurization will interfere seriously with the extension of the sanitary supervision of the production of milk, a movement which, in our opinion, should be encouraged by every means.

Recently while the public discussion on milk was at its height in our city, in a letter on the situation I made the following statement which may be interesting at this time:

"There should be inaugurated by the Department of Health of the city a system of official supervision by inspection of the sanitary condition under which milk is produced. In all such cases where the Department of Health has not the proof that

milk is produced under satisfactory sanitary conditions from healthy animals proper pasteurization should be required. A pure milk is always better than a purified milk. The public should insist upon the whole question of the prevalence of tuberculosis in cattle being taken up at once by the authorities, to the end that a comprehensive plan be provided for the eradication of this disease, both in the interest of public health and the prosperity of our dairy farmer.

"We must, of course, realize that in the carrying out of these plans the cost of production of milk will increase materially."

It is estimated that about twenty-five per cent. of the total daily milk supply of New York City is pasteurized.

THE PRESIDENT: The next paper of the afternoon, on the Pasteurization of Milk for Public Sale, will be presented by our own eminent home authority, Dr. Rotch.

THE PASTEURIZATION OF MILK FOR PUBLIC SALE.

By Thomas Morgan Rotch, M.D.

When men assemble to discuss a subject of special importance there are always a number of sides to the question under consideration, according to the nature of the subject. All subjects worth discussing are important: important, it may be, in some special line of investigation which interests alone the workers in that special line of thought, or in addition to this limited rôle of specialism, the subject may be of great public interest and importance as a whole.

Today we are dealing with the latter class. The great general subject, important among all peoples, of all ages and occupations all over the world, namely—Milk.

There is, however, one particular age among human beings to which it is most important of all, and that is infancy. The younger the individual the greater the rôle which the milk question plays and always will play in its welfare. No statistics need be quoted to show this. We all know the tremendous mortality which exists among human beings in the first year of life, and we all know how this mortality depends in great measure either directly or indirectly on the food. We all know, on the contrary, that the lowest death rate is shown among those human beings who are fed for the first year of their life on good human beast milk.

It is, therefore, the milk supply from animals, usually the cow, which in its widespread effects kills the greatest number of human beings in early life. Milk, then, is a subject which should be studied from the point of view of public health; and we at once must acknowledge that it is not merely of chemical and bacteriological interest and confined to the world of science, but that it becomes a great broad public question, affecting to its very centre the whole human race.

This means that we may lose at the beginning of life a being who later may have proved to be endowed with a great practical mind, intended by nature to evolve some wonderful discovery,—a discovery which may benefit millions of the world's inhabitants; possibly a discovery which may show how some devastating infection such as diphtheria or yellow fever can be stamped out; knowledge by which millions of human beings may be saved, instead of entering on their life's work crippled in mind and body and thus incapacitated by diseases starting in the milk period of life.

Milk, when pure, is an ideal food, but as commonly used it represents a rich culture ground for pathogenic organisms. Again, milk is a food which of all foodstuffs is the one most difficult to preserve pure and to handle with success as to its purity.

This great general subject, then, of milk for the people, necessitates for its betterment no one set of workers, but a combination of all who are connected with milk, its production, its care and its sale, as well as all who are interested in the welfare and improvement of the human race. Harmonious and combination work, then, should be done by the farmer, the contractors, the chemists, the bacteriologists, the physicians and the Boards of Health. Unfortunately, this unanimity of purpose does not exist. We therefore should call in the aid of the state to see that this combined work shall be insisted on.

I suppose that you have called upon me as having especially worked in milk in connection with the feeding of infants. This I have done for the last twenty years, and the more I have investigated the problem, the more I have found the need of an absolutely clean milk to be used in the various percentage combinations which we give to infants.

As we are today especially discussing whether all the milk supply should be pasteurized, I shall first state my ideas as to pasteurization. Those who prescribe milk and say that it should be pasteurized should know enough to say at what temperature it shall be heated. In the medical world, especially in connection with infant feeding, we should not use the word "pasteurized"; we should say heated at 212, or heated at 155, or heated at 167, and many different gradations, because we believe from our experience in the treatment of infants that one degree of heat is what should be used for a special individual and another degree for another, just as we recognize that we should give certain percentages of fat in one case, and certain percentages of sugar and certain percentages of the proteids, and just as we say we should give more of the whey proteids in certain cases and more of the caseinogen in others. We place them all upon an equal basis; we consider them equally important; and therefore as physicians

we should protest against a word which represents a generality. It means nothing to the physician who really understands what the public needs, and it means a very great deal to the public, who are taking it for granted, if the word "pasteurized" is used, that they are using a safe food. This latter view has been proved to be absolutely false. We therefore should not use the word "pasteurized."

In regard to the degree of heating in infant feeding we do not have strong prejudice against heating milk at 212. In my clinical cases, and from observations and knowing what I am doing, I am in the habit at times of heating to 212 We cannot take up medical subjects especially here, of course, but all this fear about infantile scorbutus (scurvy), for instance, from heating at 212, is mostly unnecessary, for I believe that there is still much to learn about scorbutus. I believe that we have not discovered the cause of scorbutus. In those cases where scorbutus has apparently occurred in infants who were being fed on milk heated to 212, it may have been some other quality in the milk which produced the scorbutus, and that either the percentages which the infant has been fed upon are not those which are adapted to and fitted to that especial infant, or that it is an exceedingly dirty milk which they have been boiling at 212, and which necessarily does not become a sterile milk in the meaning of infecting the individual.

For years after leaving off the heating at 212 we heated at 167. We now know that the heating at 167 affects a certain part of the proteids of the milk, and in many cases this is just what we wish to avoid. We may not wish to do it in the special case that we are feeding, and therefore we do not heat at 167. At other times it is found that 167 will be best adapted to the individual, both in the sense of digestion and in the sense of killing a certain number of organisms in the milk. It is by no means proved that heated milk is not so digestible as unheated milk. We are all of

us continually in practice using sometimes heated milk, sometimes not, by preference, of course, not heating at all where the bacterial content is so low that we do not fear sending the milk quite long distances in cold weather, and feeding most of the infants that we take care of within the city limits where we can obtain a clean milk. We also very frequently heat at 155, and although so far as I can ascertain, heating at 155 does not definitely change any of the elements in the milk, yet it is perfectly possible that it may do so.

I should, therefore, oppose compulsory "pasteurization" of milk, except in cases where it is very evident that it is needed for a special purpose. If anything in connection with the so-called "pasteurization" is to become a law, the milk should not be stamped as "pasteurized," but so as to show to what degree of heat it has been subjected. In this way the physician will know what he is using, and the public will gradually learn to understand that heating the milk in certain instances is a proper and good measure.

It is a fact that certain organisms are killed by "pasteurization," but we cannot kill the toxins of these organisms by heat, and simply "pasteurizing" or sterilizing will still allow the milk to contain elements which are exceedingly dangerous to those who drink it, and especially dangerous where young infants are concerned. Thus although you can get rid of many of the living organisms, yet there are many serious cases where the organisms have been killed, but the toxins, which you cannot kill, remaining, have caused symptoms of serious callapse. The more impure the milk is from dirt, the greater is the chance that the toxins or pathogenic organisms, may still be in it.

The heating of milk, if it is done, should be done intelligently. Otherwise, it will become a cloak for dirt, and dirt is the most dangerous of all the things which enter into milk, as it forms a culture ground for pathogenic organisms as well as more benign organisms in the milk.

I have especially spoken of infants, because, I have dealt more with early life than with these other branches of the question, but when you consider that most deaths are caused among infants, and that milk, and clean milk, is of more importance in infancy than at any other period of life, pure milk becomes a serious question of infant feeding. It is the food which is adapted to the age, a food which that age ought to have, and, of course, adults have other forms of food. There is no question, then, that we should endeavor to stamp out disease by using clean milk.

I have given my reasons for not believing in the work of "pasteurization," for not depending upon the name, and for not always heating the milk. In connection with the importance of cleanliness in the milk is that of the bacterial count. It seems to me unwise that a high bacterial count should be allowed as the limit for pure milk. Of course, it costs more to carry out the protection of milk to such a degree as to lower the bacterial count to any degree, but I believe that it would be money well spent to do so. I believe that we should begin by getting a clean milk with a low bacterial count, and that this should be our first endeavor. Later, the milk should be heated according to the individual case and conditions, and not as a measure for preservation. The improper method of heating now in vogue, where it is said to be "pasteurized," only preserves the milk some five or six hours longer than would otherwise be the case. This is sufficient, however, to get the milk to the house, where it soon sours, and this commercial "pasteurized" milk, after it has turned sour, seems to be in a great deal worse condition than when natural souring took place. This is the result of our clinical observations.

Each city, each town, is a problem in itself. What is necessary in New York, and in that sense good, may not be at all necessary for Boston or for the smaller cities anywhere. Therefore, we should judge from our own surroundings. We should take advice from those who are making a

study of this question. The boards of health know better than the physician what can be done. The physician simply asks for a clean milk, and then let him do with it as he pleases. I myself do not think that you have any more right to pass a law that all milk shall be pasteurized than you have to pass a law that all milk should contain 3 1-2 per cent. or 4 per cent. or certain variations. You have your limits of percentage. But there is also a limit to heating the milk at all. We physicians will be very glad to get rid of some of the old laws about milk, which, according to our ideas, give more trouble than even the law of compulsory pasteurization would give rise to. For instance, absolutely good Holstein milk is at times not salable on account of its total solids not coming within the limits of the law. The law demands during winter 3.70 fat and 13 solids, while in summer a 3 per cent. fat and a 12 solid. As we all know, the Holstein milk, unless the cows are especially fed, falls below this standard. Now, from a medical point of view, the Holstein milk is exactly what we find best for infant feeding, and it is an extremely good milk for any one to drink. The immense number of infants, however, who live entirely upon milk, should be taken into consideration in this question, and I believe that the people should be allowed to buy this milk just as they should be allowed to buy a milk modified to suit the special infant, who is being taken care of. I hope that the boards of health will pay attention to this question, as it is absurd for pure milk from any grade of cow to be debarred from the market because its analysis does not show what is required by an unnecessary and unjust demand.

There should be a standard for the milk from every breed of cow, and not merely an arbitrary standard which has nothing to do with the purity of the milk. It is far more important to legislate in favor of reducing the standard of the bacterial count than to attempt to obtain pure milk by demanding an arbitrary total solid.

There is another point which should be called attention to, and that is that the bacterial count varies very much according to the one who makes it. More money should be spent by the State in employing competent men to make the bacterial count. We know that under certain circumstances exactly the same milk will be said to be good by one man and poor when examined by another. This may happen, of course, in any chemical or bacteriological question, but it is worth considering.

I believe that in all our attempts to improve the milk supply and obtain pure, clean milk, we should begin with the producers at the farms. When we are told that it will cost more, we should answer that we know that clean milk costs more than dirty milk. The question of price, however, is very much more dwelt upon by the rich than by the poor. The poor are often willing to pay a higher price for their milk because they know that they will have less sickness among their children and that their physician's bill will be very much less when they are paying high rather than low prices for their milk. Milk when pure is such a valuable food that it should be well paid for, and I therefore do not believe that we should encourage the farmers to sell their milk at a low price, but that, on the contrary, we should encourage them to place their price at a figure that will enable them to provide a clean milk without loss. I believe that the State ought to take this matter in hand and in some way aid the producers. I believe that as the State has given so much aid in stamping out diphtheria by having antitoxin given free for this purpose, that it should in some way help in regard to a pure milk supply. As soon as an attempt is made to keep down the price of the milk this invariably prevents its being kept clean, and the milk supply will then get to be such that any makeshift, such as pasteurization, will make the matter far worse. We are already having quite a large quantity

of milk sold which is stamped "pasteurized." This pasteurization is often absolutely insufficient, so that we gain nothing and lose a great deal in the crusade against impure milk.

Cleanliness in milk should always come first. Then if for a time we should have a higher rate of mortality, and a larger number of babies should die, this would in the end be better than for us to encourage a thoroughly irrational method of attempting the reform. In New York they will at first probably reduce their mortality a very great deal by pasteurization but in Boston and a number of the smaller cities throughout the country, I believe that nothing lasting can be accomplished in this way. Of course, throughout the heated periods of the year, the heating at 155 or 167 of a pure, clean milk may be done to advantage. During the winter months, however, it would be much better to insist upon a clean milk, and when summer came, some additional means for preservation.

The great point is that the milk should start clean from the farm, and that the heating for preservation should be done at the farm. If this is not done, very few bacteria may be in the milk when it leaves the farm, but by the time it reaches the contractor the number will multiply immensely, and thus late pasteurization will give all the more opportunity for toxine poisoning.

The fact is that each case of milk supply is a problem and must be dealt with by the community in which it arises. I would suggest that in this question of pasteurization, which we are discussing, and of pure milk, that the producers have not been sufficiently consulted. Would it not be well that an explicit declaration should be made by the State of what constitutes a sanitary condition of barns, herds and other details in obtaining clean milk, and that a penalty should be imposed upon those who violate this law? The reform should begin back of the farm, in placing

the responsibility of fixing the standard for purity on the State. If a standard for purity were thus established, the farmer should then determine whether or not he would be a producer of milk. With an undefined and undefinable standard of pure milk, as it exists at present, the producer is in a state of doubt and uncertainty. The practicability of a standard should be determined before its enforcement is ordered, so that preparation can be made by the producers for the changed conditions. These conditions should, however, be made after consultation with the producers on whom the onus of the work is to be thrown. One of the conditions may be that the production of milk should, for chemical reasons, be a business separate and distinct from its distribution. In this way it should be not only the right, but the duty of the State to establish safe and clearly defined regulations under which the milk for consumption should be transported, and that the enforcement of such regulations should be demanded not only by the State, but by the intelligent producer as well.

The producers find that the character and quality of their herds is reduced because of the maintenance of an arbitrary milk standard, which is so low that it works a positive injury to the Jersey and Guernsey breeds, and which is so high that it fails to legalize the sale of milk from their best herds of Ayrshire and Holstein cows. This oppressive standard takes the form of an enforced sale by the producer of his product (previously contracted for in times of surplus production) in the consuming market, and this notwithstanding that arrangements had already been made to carry this surplus at a stipulated price.

Again, the development of pure bred stock has been retarded and the Massachusetts farmer has been deprived of the profit arising therefrom. In Concord, within twenty miles of Boston, where a producer has seventy-five herds, there is not one of pure bred stock exclusively, as the pure

bred herds of Holsteins and Ayrshires have been supplemented by Jersey and other grades, and the Jerseys have been reduced by supplementing Ayrshire, Holstein and Durham grades. Such questions as these should be carefully investigated before we can with any degree of success improve our milk supply.

What we need is a competitive market for pure milk from Massachusetts dairies based upon the law of supply and demand. I will say in conclusion that I make this statement after hearing what the milk producers have to contend with, that it is a question which should be placed under State legislation and that the various problems should be thoroughly investigated. Possibly the producer might have his own special milk in cars provided for that milk brought nearer to the actual consumer than is at present the case. I would also suggest that any pure milk, unadulterated, should be salable, provided that the standard percentage of fat and total proteid corresponding to the especial breed (whether Holstein or Jersey) were maintained. If in certain cases it would seem best to have the milk "pasteurized," then the degree of heat should be known to the buyer. Physicians and people could then judge for themselves, and not be bound by an arbitrary law.

THE PRESIDENT: This very interesting subject has of course many sides to it, all of which I hope will be presented before we get through with this meeting. I am going to call first upon my young friend, Dr. Norris, of Cambridge, who is in the business at present of suppressing bad milk and attempting to bring to the community better milk.

DR. NORRIS: As regards this problem, it seems to me that as we look back over the history of the improvement

of the water supply of the State of Massachusetts we get a good deal of valuable information, and that the improvement of our milk supply should follow lines very similar to that. The time was not very long ago when almost every householder in New England had his back door well. Shortly later wells were done away with, and we used ponds and various water supplies near by. As our Metropolitan water district became very much larger, it was necessary to go farther out and get huge reservoirs to supply the city. Today it seems to me that our contractors, upon whom we depend for the bulk of our milk supply, have gone through these periods: First, the neighboring towns, then farther and farther back, until now the bulk of the supply of the city is brought in from a great distance from the city. If we look over the railroad maps, very little of their supply is derived from within 20 miles of the city, but almost all of it from 100 to 200 or 300 miles out. In talking with these gentlemen you will find that the size of the farm from which our milk supply comes is one of a very few cows, dairies of from six to eight cows per herd are the ones that are producing the bulk of the milk supply of our city. Now, as we compare this condition with the improvement in various New England industries we find that the tendency of the times has been to centralize the manufacture of different products. Our mills were originally small mills in every hamlet throughout New England. Today they are largely centralized in big manufacturing establishments. It seems to me that as time goes on we have got to foster larger dairies. A dairy of 50, 75 or 100 cows can be administered in a much more cleanly manner than can the small dairy wihch is an adjunct to the ordinary country farm. The farmer is naturally averse to clean pursuits, is naturally averse to carrying out rules of tidiness. It is a side show in his life work, whereas an up-to-date, well

managed farm of the type of which we should see a great many in our suburbs, is really a rarity, and it seems to me that our contractors would do very well to subsidize some of these farms within the zone of 20 miles of our city which today are really neglected.

The point at issue, the pasteurization of milk, it seems to me in its practical aspect, is solely one of covering up the dirt and deterioration of milk. If we maintain the laws which are at present upon our statute book, and demand the low bacterial count and a high degree of cleanliness upon our farms, we are working in the right direction; but to allow this pasteurization project to become an enactment it seems to me will postpone the day to a very long period hence before we can get the conditions upon the farms which are hoped for in New York State and here.

THE PRESIDENT: I know that the Association will be very glad to hear from some of the representatives of the other side of this question, the producers of milk. There are several representatives here, and I hope some one of them will say his say upon the matter.

MR. WHITING: Mr. Chairman, you mention the producers of milk. We do produce milk to some extent, although our business is chiefly that of milk contractors. To say that we are deeply interested in this subject hardly expresses it. Our attention is directed especially to this question just now because we do not know whether to launch out into pasteurization or to go on, as Dr. Rotch says, "trying to bring about a condition in the country which will get a sanitary milk for the Boston market," thus doing away with the dangers, if there be any, by pasteurization. Very much is being done in the country, more than anybody is aware outside of the City and State Boards of Health. The reason that we are so diligent is that we appreciate the importance and responsibility of getting as nearly an ideal milk supply for this market as can be had.

The contractors who are in this room supply the greater part of the milk that is used in the City of Boston and its suburbs. I know it is a fact that they are all working very energetically to that end. Farms that are in an unsanitary condition, our inspectors, who are in part veterinarians, visit at frequent intervals. These men are constantly travelling over our whole milk territory.

It seems as though our condition in Boston is rather different from that in New York. It is not uncommon to bring milk three or four hundred miles to the New York market, while two hundred miles is the outside limit for Boston. There is hardly any milk within twenty miles of Boston brought to this city, except by a few wagoners (as they are termed.) Dr. Norris suggests these farms might be reclaimed for the production of milk. I think this would hardly be practicable, for the wealthy man of Boston wants his nearby farm for his pleasure and is fast getting out of the notion that there is much satisfaction in producing milk to sell to the Boston market, even though he gets eight, nine or ten cents per quart. The contractors get the greater part of their milk supply beginning at a distance of forty miles from Boston up to one hundred miles, so the degree of freshness of the Boston milk supply as compared with that of New York is very much in favor of Boston. We can bring milk here, in other words, in the raw state, with greater safety to the consumer than can be done in New York.

We buy practically no milk that is not cooled by the use of ice on the farms. We have put out circulars for the last three or four years to the effect that we would not take milk unless cooled in ice water. We are more insistent upon this all the time. We have never tried the experiment of bringing milk into Boston without ice, as is done in many cities.

We are not averse to pasteurization if it can be shown that it is the best thing. As we said a short time ago to certain members of the Board of Health, if the 500,000 per cubic centimeter bacterial count is insisted upon, it would be almost necessary at certain times in the summer season to pasteurize our milk; but I think we stand today for non-pasteurization, providing we can feel reasonably sure that the present bacterial count will not be insisted upon too strongly. If milk is not to be pasteurized, more effectual work must be put in in the country in order to comply with the rules of the Board of Health.

We are here for information; very much interested in this subject; hoping that something will come out making us feel more strongly whether we shall go to the expense and labor of pasteurizing. If we could believe that pasteurization would prevent an epidemic that might arise through the handling of the milk, such as the epidemic of scarlet fever we have just experienced in Boston, we should at once adopt pasteurization. There would still be an opportunity, however, for milk to be contaminated after being pasteurized; but in the recent scarlet fever epidemic, after thorough investigation, we have yet to find that the source of the epidemic could be positively fixed.

Some of us at this time are expending large sums of money to perfect our plants, adopting the most modern methods of handling milk, and are anxious to know whether the majority of those who are competent to judge are in favor or not of pasteurization. We shall be very glad to hear the discussion.

I would like to mention one safeguard we have recently put on our milk supply. In our contract with farmers we state that in the event of any infectious disease in a farmer's family, or on his premises, we will pay for the milk produced which shall be poured upon the ground each day while in quarantine; so there will be no temptation for a

milk producer to ship milk for one or two days after suspicion of some infectious disease. We look upon this provision as an extra safeguard.

THE PRESIDENT: No man has had a larger experience in measures of control in this State, no man knows more about the subject, no man knows so much about the subject, probably, as Dr. Harrington, and I shall be glad to have him tell you what he thinks about it.

DR. HARRINGTON: Mr. President and Gentlemen: I am, and for a long time have been, very much opposed to the commercial pasteurization of milk, because, as Dr. Norris and Dr. Rotch have said, pasteurization of the public milk supply will put back improvements at the source of the supply; it will encourage dirty habits, because it will be understood by the farmer that it is unnecessary to be quite so particular about cleanliness, since the dirt that gets into it is going to be cooked and made harmless. Again, it will make possible the carrying along of milk until, although not sour, it may become more or less poisonous. I believe that dirty milk should be allowed to stay dirty, so that it will sour the more quickly, rather than that the lactic acid ferments shall be destroyed and the commercial life of the milk be prolonged, thus permitting those organisms which are not affected by heat, and which are believed to elaborate toxic substances, to go on making of the milk dangerous.

There is one point which has been touched upon by Dr. Lederle, which is now regarded as of the very greatest importance and is beginning to receive a good deal of attention, and that is the possibility of infection at the source or in transit through agencies that can, perhaps, hardly be detected until after the mischief is done. I refer to the chronic carriers of the typhoid germ. The case which Dr.

Lederle cites is the first one, so far as I know, that has been run down by any American public health authority, but in Europe they have been looking into the subject for some time. One authority reports having examined 1700 people, among whom he found 23 chronic carriers, and 11 of them had absolutely no typhoid history. In an asylum where a number of cases of typhoid fever had occurred, one after another, and where there was no suspicion of the food supply nor of the water supply, the authorities began examining the patients. They found seven typhoid carriers out of 250 patients. One of these typhoid carriers died of some other disease, and on post-mortem examination, the gall bladder was found to contain a pure culture of the organism and a number of gall stones. In a fair proportion of the cases that have been cited in which a post-mortem examination has been made, the gall bladder appears to have been the source of the bacilli. In some cases the typhoid bacillus has been found in pure culture and in others in mixed culture. I don't know what it is possible to do with this poor woman in New York. She is apparently in good health, but she is a common nuisance and is disseminating the exciting cause of a dangerous disease. I cannot see how it is going to be possible to disinfect her gall bladder, unless it is taken out; and I presume that most of the chronic carriers are in the same condition that this woman is, and that the bacilli are probably in the gall bladder and are being excreted daily.

Somebody spoke of concentrating all the efforts at improvement at the source of the milk. I believe in making improvements, not only at the source, but in transportation, in handling and in storing. In January we had in this immediate vicinity more than 600 cases of scarlet fever, all inside of a week, and nearly all on the same milk route. There was reason to believe that the milk was infected by the man who did the tasting, going from can to can,

taking some of the milk out with a spoon, throwing away the surplus, licking the spoon and dipping it into the next one without any washing. Now, there is a case where it happened in transit. No matter how clean that milk may have been at its source, it would have been infected anyway. During the past two weeks there has been another explosion, this time of diphtheria, in which some 80 cases have occurred in the towns of Milton and Hyde Park and one of the outlying wards of Boston, Dorchester. The cases were all on the milk routes of two men. These two men get their milk from a common source. The wife of the man from whom they got their milk had the care of the milk vessels, washed the tank in which the milk was mixed, and took care of a grandchild with diphtheria, and there can be no possible doubt that the outbreak was due to the infection of one day's supply by that woman. The more these local outbreaks are examined into, the more frequently are they found to be due to contaminated milk, and we have got to enforce cleanliness at the source of the supply, cleanliness in transit, and cleanliness everywhere from cow to consumer.

THE PRESIDENT: This whole subject is before the Association for discussion. I hope that anyone who has a question to ask or an opinion to express will ask his question or express his opinion. We are here to learn.

MR. HOOD: Mr. Chairman and Members of the Board of Health: In the discussion here today very little, if anything, has been said concerning the difficulty of the care of milk in warm weather as compared to its care in cold weather. It was intimated by one speaker that milk to be handled safely should be pasteurized in hot weather on account of its poorer keeping quality at that season. I am inclined to believe that if milk is to be pasteurized for

safety it is more necessary for it to be pasteurized in cold weather than in warm weather on account of the conditions being more favorable to the spreading of disease through milk during the cold season. In hot weather, the farmers at the dairies realize that they must immediately cool their milk, that it must be put into clean cans, and must not be kept around for any length of time. Transportation companies realize the same, and the housekeeper in the city and everyone who has anything to do with milk gives it its greatest care in the hottest weather. When milk changes in hot weather, it is almost always one of souring, and it is well known that there is less danger of ptomaine poisoning from sour milk than there is in the use of milk which has undergone putrefactive changes, which is more often the change taking place during the cold weather.

I have been very much interested in the papers read today, and, as has been previously said, we wish to know what we should do, whether we should arrange to pasteurize the milk or not. From a sanitary standpoint, I believe that a clean milk is more important than a pasteurized milk, and that the Board of Health by sending agents into the country to the dairies, even though they go but once, shows the producers that a better milk is being demanded by the public, as well as the milk dealers. The hardest propositions that we have to deal with in many cases are the producers that have been furnishing milk the longest for the city market; they are the hardest to convince of the requirements of the up-to-date milk business.

DR. ROSE: I would like to ask if dead bacilli are a safe article of diet.

THE PRESIDENT: Dr. Smith, I think you ought to answer that question.

DR. THEOBALD SMITH: Mr. President, it seems to me that the opinion of the meeting today is opposed to pasteurization, and on that account I prefer to say a few words on the other side, not because I am specially convinced that pasteurization is the best thing. It seems to me we must not throw aside pasteurization, because it is the inevitable outcome, I think, of the future. To drink unpasteurized milk is very much like eating our meat raw. We should not think of eating that raw, but we object to the pasteurization of milk. The only difference between the two processes is that we sterilize our meat ourselves just before we eat it, and our milk is to be pasteurized for us some time before we take it. It seems to me that from a bacteriological standpoint the pasteurization of milk will not conceal dirt, for the reason that the bacteria that come from the udder are the ones that will be destroyed, but the bacteria that come from dirt are largely the spore-bearing bacteria, and they will survive. I believe that we could control the quality of milk quite as well after it was pasteurized, by bacteriological counts, than before, because certain species only would go on multiplying, and the indicators would be much better than they are today. If we examine a plate made from milk, for instance, nobody can tell exactly whether the bacteria on that plate are due to dirt or whether they are due to the multiplication of ordinary lactic-acid bacteria, unless a very careful study of that plate be made. As a rule, if nearly all the colonies are alike we assume that they are the result of multiplication. If they are quite different among themselves we assume that there has been a good deal of dirt added to the milk. Now, it seems to me that with the pasteurization it would be possible to control the dirt in the milk much better than it is done today.

You have just heard of a number of instances of epidemics due to milk. Those particular epidemics cannot be abso-

lutely avoided by simple cleanliness. The human bacteria carriers are more or less concealed. They cannot be brought to light by ordinary means. It seems to me that the only way to prevent the conditions that lead to epidemics would be to have certain laws passed which would prevent any person, first,—going into a dairy when in his household there is disease of an infectious character, and secondly, to make a regular medical inspection of the persons working in dairies. Even this scrutiny would hardly disclose all bacteria carriers. It seems to me that the real difficulty of the present condition is the transmission of specific disease germs which are not easily controlled by any amount of cleanliness, and these specific disease germs, one and all of them, may be destroyed by the average pasteurization above 140 degrees F. for 20 minutes.

THE PRESIDENT: Dr. Lederle, I think I will ask you to summarize.

DR. LEDERLE: It seems to me if I were to summarize the situation I would say the necessity for pasteurization on a large scale is the outcome of the neglect of the State and the local authorities to give the people a safe and clean milk supply. I think that is practically what it comes to. Until the state and the local authorities can assure the public of such a safe and clean product, we will have to use pasteurization or any other equally good means to accomplish it.

MR. GRAUSTEIN: Mr. Chairman, I wish to say that I represent two companies, and one of them puts out all pasteurized milk. It is a small company at present. It is putting out about 1,000,000 quarts a month. I am satisfied that the pasteurization of milk is the best thing. In this very epidemic of scarlet fever that is spoken of here, we

did not have a single patient that we supplied when those 600 cases were in Boston and vicinity. I claim that if the milk is properly pasteurized it will destroy all germs. There are various systems of pasteurization. The system we use is one that I invented myself, and I am satisfied that it will kill the germs. But I think pasteurization should be done as soon as milk is drawn from the cow. To carry my idea of pasteurization further I am now establishing a local pasteurizing plant where my supply comes from in the country, and I expect inside of fifteen months to pasteurize the most of my milk that comes from a distance in the country. I have one establishment now where the milk is milked and at once brought to the plant and pasteurized, and in that establishment the milk gives very low bacteria count. By pasteurizing it there and then sending it on a long transportation the bacteria count does not grow. I should think that there is not anything quite so safe for the public of a large city as a pasteurizing plant at the other end, where the milk can be pasteurized as soon as possible after it is drawn from the cow.

DR. LEDERLE: I would like to say that when I used the term "neglect" I wanted to convey the thought that the authorities are not sufficiently "backed up," so to speak, by the public. They have not sufficient means, as a rule, to carry out these improvements. But I still insist that a great deal of the work should be done through the state and the municipal authorities, and when that work is done as it should be done, it seems to me that the necessity for pasteurization will be practically removed—perhaps not entirely, but practically so. In all these matters we should try to be practical. I will give you an illustration. About two years ago I was consulted by a large milk concern in New York, supplying perhaps over 200,000 quarts of milk a day to the poorest sections in the city. I knew what their

conditions were. They obtained their milk from perhaps 1800 farms, over which they had no supervision. I recommended that they should install pasteurization plants. They erected them in the city at a very large expense, perhaps $60,000 or $70,000. The conditions under which they labored were such that it seemed to me this was the very best advice that could be given, and I will add that I very reluctantly gave them that advice. What I should like to have seen them do would be to be able to control every one of those farms so thoroughly that they would produce a quality of milk which Dr. Rotch here to my right would approve of for infant feeding. But it was simply out of the question. They had neither the support from the State authorities or the local authorities, nor was it possible for them to increase the price of that milk, 240,000 quarts a day, by a fraction of a cent without causing a great deal of trouble, and probably misery, among the thousands of families that they supplied. Now, here was a practical proposition, and I would like to ask any one in this room to suggest some better method of attaining the same results that we did in that particular case by any other method. I would be very glad to hear opinions on this. I would like to say that what was accomplished was that the milk was taken to stations which it was possible to put under control of men of a very much higher grade than is usually found in the small creameries in the country. It was also possible to have machinery by which the utensils could be thoroughly washed and thoroughly sterilized, something that had never before been done by this concern, and which of course should have been done from the beginning. The milk, therefore, was placed under very much better control. The 240,000 quarts were distributed to the poorest people in the city of New York, the cans and utensils were thoroughly sterilized, every drop of this milk was filtered and pasteurized at a low temperature, and the dealers were able

to sell it at a price which did not require the advance of even one cent a quart. What confronted us was a hard practical problem, and I would like very much to hear from any one in the room of a better solution.

DR. ROTCH: I think each case is a problem to itself. Dr. Lederle is right. But that is no reason we should take a special case as any argument whatever for passing a general law, as there are a very large number. You did not mean that, Doctor, did you?

DR. LEDERLE: Oh, no.

DR. ROTCH: That is what I mean. Of course take each case, each city, each town, inspectors or health boards understand each in their individual place what is needed.

DR. HARRINGTON: Mr. President, I understood Dr. Lederle to say in his case that there were some 1800 farmers who were absolutely beyond the control of a concern that was dealing in the milk.

DR. LEDERLE: Practically so.

DR. HARRINGTON: And that the local authorities and the state authorities would not do anything.

DR. LEDERLE: Well, they could not do it for an individual. They were not making general inspections. These farms were located in, I think, three different states, if not four.

DR. HARRINGTON: That is to say, they were beyond the control of the state authorities.

DR. LEDERLE: Well, not entirely, not if the state

authorities had a proper system of supervision, which they should have.

DR. HARRINGTON: I mean those that were outside the state were beyond their jurisdiction.

DR. LEDERLE: They were under the jurisdiction of some other state, and there is no reason why that other state should not have the same care of its milk supply as our own.

DR. HARRINGTON: If you did not have the backing of the local authorities nor of the state authorities, of course there was nothing to do but to proceed as you did.

DR. LEDERLE: Practically not.

DR. HARRINGTON: But when you have got the backing of state authorities or local authorities, you don't need to do that at all.

DR. LEDERLE: When you get to that point I agree with you absolutely.

DR. HARRINGTON: In this State some local authorities are co-operating with the State authorities in trying to secure a clean supply. When the milk supply of Springfield, for example, was examined something more than a year ago, the inspector for the State Board of Health had to go down into Connnecticut, and he examined every farm in Connecticut that was sending milk up to the Springfield market. Every one of those men who had a dirty place or was following dirty processes received a letter from the State Board of Health, telling him what he had got to do if he was going to ship any more milk into Massachusetts. In a short time the inspector

went down again and looked over the premises, and found that part of them had not done what they were told to do. The authorities at Springfield were communicated with, and they prohibited bringing that milk into the city, and the Connecticut farmers who were not willing to keep clean could keep their milk; they could not bring it into Massachusetts. Day before yesterday, 41 farmers over the line in New Hampshire got the same sort of a notice, and the Board of Health of the city of Boston was informed of the fact that these men had been notified to make certain changes; and the contractor who buys their milk and receives it here was notified. I know what he is going to say to them. He is going to say, "If you don't do what you are told to do, you can't ship any more milk into this market." I am already hearing from these New Hampshire men, and they say, "We are cleaning up. We are going to get our places in proper shape, so that we can continue to send milk to Massachusetts." That is the way to do it. Those within our own jurisdiction can be taken care of. They are not ordered, because we have no right to order them, but it is suggested to them that they do certain things, and the local authorities are requested to see that those suggestions are carried out, and if they refuse to carry them out the local authorities, many of them, prohibit the sale of the milk, pass regulations concerning the production, handling and sale of milk, and prohibit the introduction of any milk that does not conform to the regulations.

DR. LEDERLE: Don't misunderstand me, Doctor. That is what New York is trying to do.

DR. HARRINGTON: I understand that that is what they are trying to do now.

DR. LEDERLE: But the problem is such an enormous one that it is going to take a long time, even with unlimited money,

to get around to all of them. Remember that the experience I referred to occurred almost two years ago. If that particular company had attempted to get special co-operation with either the State or the local authorities, and had special inspections made which were not being made generally throughout the dairy districts, most of those farmers would have left this company and would have taken milk to those creameries that were not under such strict control. The inspection must be general.

DR. HARRINGTON: Yes, I understand that.

DR. LEDERLE: In the meantime, if the dealers had not pasteurized their milk, that particular supply would still be coming in and would have come in for those two years, without any special supervision. Now, the question is, did the public derive any benefit through that system of pasteurization during those two years? I would like to say that when I gave them that advice I also told them that it should not absolve them from the responsibility of the conditions existing on those farms, and that care must be exercised in order to produce proper conditions, and that the fact of pasteurizing the milk should not stand in the way of reducing the existing evils. That is the position that I take now.

DR. HARRINGTON: I would like to ask Dr. Lederle if many examinations have been made of pasteurized milk as it is sold.

DR. LEDERLE: Yes, quite a good many.

DR. HARRINGTON: And is the bacterial count low?

DR. LEDERLE: Not always, no. You said a little while ago that if pasteurization is used rather generally it will have the effect of making the farmer more careless in the production of his milk.

DR. HARRINGTON: I said that he would have an excuse for beginning.

DR. LEDERLE: It will tend that way. But if you have the power now, and the funds to exercise proper supervision of the milk at its source, you ought to maintain the inspections just the same, whether the milk is being pasteurized or not. You are to determine that, not the farmer. Of course the farmer will be more lax if he thinks the milk is going to be pasteurized, but the authorities should not be any more lax.

DR. HARRINGTON: True.

DR. LEDERLE: It should not be left to the farmer.

DR. HARRINGTON: The reason I asked about count is that a large number of samples of milk taken in Boston from a concern which pasteurizes its milk revealed the fact that that milk yielded a larger bacterial count than the average milk that was not pasteurized. Where, before the process of pasteurization was started the average of the samples of that concern may have been, say 200,000, after they began to pasteurize it ran up into the millions. The fact is, the milk was simply heated and then was not properly cooled. In other words, the milk was heated to such a point as to make it a little more favorable breeding ground, and much more rapid multiplication took place. I fancy that that is the kind of pasteurization that we would be very likely to see, unless it was all done under some competent supervision.

DR. LEDERLE: I think the same supervision ought to be exercised over pasteurized milk as in the care of raw milk.

DR. HARRINGTON: There was another point that Dr.

Lederle made, with reference to compulsory pasteurization in Denmark. If there is a law requiring the pasteurization of milk in Denmark it must have been passed within a year and a half, or else it is not enforced. In Copenhagen there are two very large milk contracting concerns. One of them advertises that it pasteurizes its milk, and the other one issues circulars all over the city that it does not, and every bottle that it sends out has the disadvantages of pasteurization set forth. One prides itself on the fact that it pasteurizes, and the other, in competition, prides itself on the fact that it does not need to.

DR. LEDERLE: You can take your choice.

DR. BURR: Coming back to the question of the pasteurization of milk, what is the ordinary listener here to conclude today from what he has heard? It seems to me that after you have got the cleanest milk possible, and all these tarms in the cleanest condition, there is only one thing to do, to pasteurize the milk after you have had it in a thoroughly clean condition. I am only judging from what we have heard today. I don't know what the ordinary listener can really conclude from what we have heard. All the milk, after it is pasteurized is still ready to transmit contagious diseases.

THE PRESIDENT: The Association, fortunately, has as its guest today a representative of a health board on the other side of the Atlantic, the country that has shown the way, opened the way to sanitary control. I am going to ask Dr. Tattersall if he won't say a word or two to us.

DR. TATTERSALL: Mr. President and Gentlemen, I should say that I am in this country on the errand of learning how to procure a pure milk supply, so that I need hardly

tell you how great a privilege I feel it to be present at this interesting discussion today, and I feel especially indebted to my friend, Dr. Harrington, for the opportunity that I have just had. The milk question is agitating the minds of all people interested in public health on our side of the water, as it is evidently on this side. We have the impression that on your side you have already solved the problem, and I must say that on landing in this country I was rather surprised to find that every one interested in public health whom I had the pleasure of meeting was full of the pure milk question, and that it was not solved, but that it was only in process of solution. You are, I feel convinced, much further on the way towards a satisfactory solution than we are. But I must admit that it came as a great surprise to me that this meeting was this afternoon to consider the question of pasteurization of milk. We have had this question discussed and discussed, and I think we have relegated it finally, at least I hope so, to the limbo of those things which we never want to hear of again. As a general proposition, to cover the whole of a milk supply, I think it is an unsatisfactory and a very feeble way out of this very important subject. The essentials are that our milk shall be pure, and that it shall be well regulated, and what is wanted is that the state and the public health authorities, combining with the trade interests of the milk vender and the farmer, all giving fair consideration to all interests, should still obtain a supply of milk that can be guaranteed as free from danger to any one. I don't see why in the progress of a few years this should not be obtained. I have heard a great deal since my coming to this country as to the methods and the conditions of your farms, the methods of farming and the methods of inspection, the way in which you deal with milk in transit and in delivery, and I must say that on the whole, you are enormously in advance of the old country in this matter, and I am taking back, I hope, some information that may prove

useful to us.

(On motion of Mr. Coffey, the Association then adjourned.)

COMMUNICATIONS.

FINGER PRINTS AND THE VITAL STATISTICAL RETURNS.

[From Albert C. Nyhen, *Assistant Bacteriologist,* Brookline Board of Health Laboratory.]

The scientific, irrefutable identification of the individual, is a great need of the day.

Many authorities of the civil, military and commercial world have recognized this want in adopting the "Finger Print System of Identification," and much has been done to extend the application of this system in the various departments of the government.

The greatest value in the application of this system for practical purposes depends largely on the number of finger prints formulae available for references.

A word about finger patterns:—There are ridges in the skin on the bulbs of the fingers and thumbs which are present at birth and remain distinct until the decay of the skin after death.

These ridges are of a distinctive pattern on each finger and are constant during life. These ridge patterns can be differentiated from each other in the digits of an individual, likewise the patterns of individuals can be differentiated from those of another person, thereby eliminating the possibility of error by duplication. These ridge patterns have well defined and recognized characteristics which furnish abundant minute reliable

data to compose a formula for purposes of classification and filing.

A skilled classifier of finger prints formulae can differentiate between various formulae and finger prints as rapidly and as skilfully as a bank teller can differentiate and count a pile of bank notes.

Without having finger print originals, at birth to start with, a limited number of identifications later in life can only be made, and is then of value only in distinguishing between individuals whose prints have been obtained for various specific reasons.

The best means for obtaining abundant finger print material for future reference work is through the registrar's returns of the vital statistics. Not only can a large amount of reliable basic data for future identifications at large be obtained, but it will serve the immediate local purpose of authenticating hereafter the person or persons named in a document submitted for registration.

The data fixing the identity of a person should be obtained as early in life as possible; therefore at birth, finger prints should be returned on the birth certificate (of the subject reported). This done, the individual is traceable through life.

The means (finger prints) of recognition are constant during life and also until a short time after death. The system is accurate, simple of application, also admitting of rapid and easy interpretation.

John Doe may change his birthname to Richard Roe when he marries; to John Smith if he ventures bigamy, and may die in some distant insane asylum as John Jones, but if his finger prints are on record, he will be identified anywhere under whatever name, dead or alive, as the original John Doe.

The time is not far off, when it will be found absolutely necessary to obtain finger prints at stated periods in the life of a person. These prints will be required at birth to start a person's accurate life history with the community, and at death to definitely close his career.

The registrar's returns of the vital statistics afford with little trouble, the best opportunity for obtaining the primary and early identification and registration of a person's existence; likewise the death certificate also furnishes an excellent chance to secure for record the finger prints of the deceased.

There can be no objection to the use and application of this system on the grounds of social or class, religious or sexual differences.

[A series of newspaper clippings was submitted, showing where lack of identification resulted in lawsuits, indictments for various offenses and much confusion, delay and ultimate uncertainty. Ed.]

CHEMICAL LABORATORY NOTES.

By Franklin C. Robinson.

Professor of Chemistry, Bowdoin College, Brunswick, Me.

STANDARDIZATION OF DISINFECTANTS.—Since Rideal and Walker proposed a method for standardizing disinfectants by comparing them with carbolic acid, and thus getting their carbolic acid coefficient, as they called it, others have repeated and extended the work, and found certain things which must be taken into account if such coefficients are to be practically useful.

First, M. Winter Blyth found that organic materials and especially milk interfered with the uniformity of the results.

Harris and Praüsnitz* have confirmed Blyth's work, and propose a material, made from urine and feces, to be used in all standardization experiments. They prepare this as follows:

Solid feces are shaken with distilled water and strained through a sieve of 30 meshes to the inch. This gives an emul-

*Journ. Royal Inst. Pub. Heal., March, 1907.

sion containing solid particles closely imitating average substances to be disinfected in practice. This emulsion is then tested for its oxygen consuming value and diluted until this value is equal to a double normal solution of potassium permanganate. Human urine is then taken and its oxygen consuming value determined, and diluted until this is equal to .4 normal potassium permanganate. These solutions are kept separate until wanted and then equal volumes taken for the test substance.

They found in the case of typhoid bacillus that in this mixture the carbolic acid coefficients of disinfectants were only about one-half what they were found by Rideal and Walker. They also noticed, what H. D. Evans of the Maine Laboratory of Hygiene had previously found, that in getting the coefficients of some disinfectants, notably of the mercury compounds, great care must be taken not to carry into the medium in the final plating traces of the disinfectant, which will inhibit the growths to a marked degree and make the results inaccurate. This is easily obviated by putting the loop of material first into considerable sterilized water, and then plating from this. It is to be hoped that other laboratories will take up this matter and thus a standard technique be developed which will give reliable results.

FORMALDEHYDE DISINFECTION AS AFFECTED BY HUMIDITY AND TEMPERATURE.—Experiments by H. D. Evans in the Laboratory of the Maine State Board of Health* show that a room must have an initial humidity of at least 50 for efficient action of the gas. If this humidity is maintained the question of temperature is of little importance, but at temperatures below 65 degrees F. polymerization takes place with the formation of a solid which removes much active gas from

*Bulletin for March, 1907.

the room and consequently diminishes the disinfection. He found that it is much better to have this humidity before the gas was liberated than to depend on the water in the formalin to produce it.

His conclusions are that with the permanganate method, and proper humidity, even in a room only 65 degrees F. efficient disinfection can be obtained with only one and one-half hour's exposure.

It is interesting thus to see the rapid development of formaldehyde disinfection, the rapid simplification of it, since that Buffalo meeting of the American Public Health Association, in 1893, when the first practical apparatus for its use was exhibited by the author of these notes. As in so many other cases, the first development was in the line of complexity, but then a simplification followed which has continued until now. The next development of room disinfection should be to find some harmless and inoffensive material which can be applied to a room surface and keep it disinfected permanently or for a long time, something which will catch the germs as they are dust-borne into a room and thus take away the necessity for these spasmodic and generaly ineffective disinfections which partake of the nature of locking the stable door after the horse is stolen.

DETECTION OF FOREIGN COLORS IN WINES.*—50 c.c. of the wine are treated with 1 c.c. formalin and 4 c.c. conc. hydrochloric acid, and the mixture heated in the water bath until the precipitate forms. The solution is then made alkaline with ammonia and all excess of ammonia expelled by further heating in water bath. Cool and filter. With natural wines the filtrate is colorless, but with artificially colored wines the color remains.

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*Ann. Chim. Anal., 1907, 12.

DETECTION OF CANE SUGAR IN MILK AND CREAM.†—Mix 15 c.c. of milk or cream with .1 gram resorcin and 1 c.c. conc. hydrochloric acid and heat to boiling. In presence of cane sugar a fine red color is produced, while pure milk turns brownish; .2 per cent. can thus be detected, according to the author. Levulose gives the same reaction. but glucose does not.

PERSONAL HYGIENE.

By Percy G. Stiles. S.B.,

Instructor in Physiology, Massachusetts Institute of Technology.

THE REACTION TOWARD LIBERAL FEEDING.—It is now two years since Chittenden's "Physiological Economy in Nutrition" was published. The experiments there recorded presented a mass of evidence which seemed to show conclusively that the standard diets of earlier writers, with their average protein content of 100g and their fuel values approximating 2500 Cal., might be greatly cut down with none but favorable effects upon the strength and well-being of the subjects. A reduction of the protein from 100 to 50g and of the fuel value from 2500 to 1600 Cal., was strongly recommended. The scientific arguments of Chittenden have been repeated in popular form by Horace Fletcher, the best-known advocate of the lenten diet.

Howell, in commenting upon these views in his "Text-book of Physiology," (1905), expressed doubts as to the policy of long-continued low feeding, holding that the instinctive

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†H. W. Anderson, Analyst, March, 1907.

choice of all races can hardly be vicious and laying stress on the fact that abundant feeding, especially of protein, certainly helps to combat tuberculosis and other infections.

The first extended criticism of Chittenden's teaching has come from Benedict (American Journal of Physiology, Vol. XVI., August, 1906). It gathers a formidable array of evidence in favor of something like the older and more generous rations. It is pointed out that Chittenden's most brilliant witnesses have proved to be back-sliders when released from their obligations to eat lightly. It is shown that with sparing protein feeding the absorption from the intestine is less complete than with a somewhat larger supply. A minimal diet may thus weaken the digestive powers and mischief from unabsorbed residues may occur as a result of the very stinting undertaken to avoid it. This would seem to be still more likely from the constipation produced by Fletcherism.

Benedict cites interesting facts which have just been made known in Japanese publications. This Eastern race has often been described as one which has accomplished great things upon a habitually meagre diet and with its protein especially limited. It is now shown that the Japanese ration is not very small for the stature of the people, and that it is being increased in the navy with marked advantage. The adoption of European standards of feeding has lessened the amount of sickness—particularly of beri-beri—to a very gratifying extent.

Reports from several Agricultural Experiment Stations (e. g., Minnesota), state that the effect of low protein feeding upon live stock is most unfavorable, but that the evil results are long deferred, becoming apparent only in the second or third years of the regimen. Benedict, therefore, suggests that while the reduced diets were not seen to do harm to the various volunteers at New Haven, malnutrition might ensue if the course were prolonged and that a real demand

for more nutriment explains the lapses of many of these men into their old habits.

Benedict accounts for the maintenance of the body-weight, which is sometimes surprisingly good upon a slender diet, as being due to the accumulation of water in the tissues in place of oxidized fat. There must be a limit to this substitution, but it is well worth taking into account. An experiment made upon Fletcher in Benedict's calorimeter showed that the metabolism of the subject was 25 per cent. in excess of his own estimate, based on the assumption of equilibrium between income and outgo. In other words, his diet was not a sufficient one, at least for that day, and the waste of his adipose tissue which must have occurred was disguised by a slight increase of water representing weight, but not energy.

Meltzer has scored the ideal of the minimal diet in an original and suggestive article in "The Journal of the American Medical Association (Feb. 23, 1907). He shows that almost every organ of the body has much more substance than is absolutely required for its work. One kidney, one lung, a large part of the intestine may be dispensed with. If this is true, then the risk of over-taxing these organs by enjoying an old-fashioned diet can hardly be so great as has been claimed. Meltzer thinks that a reasonable surplus of food is as natural as the surplus of liver-substance so liberally provided by nature. To live on as little food as possible, he says, may be no more normal than to live with one kidney. Because one kidney will answer it does not follow that two will not work better, and because 1600 calories will sustain life and strength, we need not deny all utility to extra fuel supplies.

VETERINARY HYGIENE.

By Veranus A. Moore. B.S. M.D.

Professor of Comparative Pathology Cornell University, Ithaca, N. Y.

THE SECOND INTERIM REPORT OF THE ROYAL COMMISSION ON HUMAN AND ANIMAL TUBERCULOSIS.—This is the second report of the Commission appointed soon after Koch read his famous paper on tuberculosis at the International Tuberculosis Congress in London. The questions before the Commission upon which they have now reported are:

1. Whether the disease in animals and man is one and the same?

2. Whether animals and man can be reciprocally infected with it?

3. Under what conditions, if at all, the transmission of the disease from animals to man takes place. and what are the circumstances favorable or unfavorable to such transmission?

The general conclusions which they draw from their investigations are:

"There can be no doubt that in a certain number of cases the tuberculosis occurring in the human subject, especially in children is the direct result of the introduction into the human body of the bacillus of bovine tuberculosis, and there also can be no doubt that in the majority, at least, of these cases the bacillus is introduced through cows' milk. Cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis in man.

Of the sixty cases of human tuberculosis investigated by us, fourteen of the viruses belonged to Group I, that is to say, contained the bovine bacillus. If, instead of taking all

these sixty cases, we confine ourselves to cases of tuberculosis in which the bacilli were apparently introduced into the body by way of the alimentary canal, the proportion of Group 1 becomes much larger. Of the total sixty cases investigated by us, twenty-eight possessed clinical histories, indicating that in them the bacillus was introduced through the alimentary canal. Of these, thirteen belonged to Group 1. Of the nine cases in which the cervical glands were studied by us, three, and of the nineteen cases in which the lesions of abdominal tuberculosis were studied by us, ten belong to Group 1.

These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source.

A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli. The presence of tubercle bacilli in cows' milk can be detected, though with some difficulty, if the proper means be adopted, and such milk ought never to be used as food. There is far less difficulty in recognizing clinically that a cow is distinctly suffering from tuberculosis, in which case she may be yielding tuberculous milk. The milk coming from such a cow ought not to form part of human food, and, indeed, ought not to be used as food at all.

Our results clearly point to the necessity of measures more stringent than those at present enforced being taken to prevent the sale or the consumption of such milk."*

These findings differ considerably from those heretofore reported in this country in the proportion found to be of bovine origin.

INFECTIOUS ABORTION IN CATTLE.—In the *Journal of Comparative Pathology and Therapeutics*, 1906, Bang dis-

*The Vet. Journal, April, 1907.

cusses the methods of preventing this disease based upon the theory of its etiology elucidated by him some ten years ago. It is his opinion that where the nature of the disease is understood by the cattle owners they may readily protect their herds against it by proper sanitary precautions.

During the past three years he has carried on experiments in attempting to immunize cows, sheep, and goats against the disease. It has been observed that aborting cows acquire a certain degree of immunity. In this work intravenous injections of serum boullion cultures of the micro-organism of abortion were adopted. In some cases this treatment produced abscesses and other symptoms of reaction, but considerable immunity resulted, and Bang hopes that this method of vaccination will ultimately give a means of controlling the disease.

IMMUNIZATION TOWARD ANTHRAX. *Zeitschrift fur Hygiene und Infek. Krankheiten,* 1906, Murillo has proposed a new method for vaccination against this disease. His method is based upon the antagonism between bacteria or higher plants which are growing in the same medium. He found that diphtheria toxin had the power of attenuating anthrax bacteria. His experimental tests gave results which indicate that this method may be used quite successfully.

He claims certain advantages for his method over the Pasteur system. According to the latter method a temperature of 42 degrees C. is recommended for the attenuation of the anthrax vaccine. By Murillo's method any temperature up to 37 degrees is satisfactory. It was also found that it is not necessary to use the cultures on a certain day, but that they remain suitable for a number of days after treatment. By combining cultures and toxins in different proportions in ordinary bouillon it is possible to obtain a wide series of gradations in the vaccine.

PREVENTIVE THERAPEUTICS.

By Herbert D. Pease, M.D.

Director of the Antitoxin Laboratory, New York State Department of Health, Albany, N. Y.

THE TETANUS ANTITOXIN UNIT.*

A new American standard for tetanus antitoxin has been devised by a committee of the Society of American Bacteriologists, composed of Drs. J. J. Kinyoun, chairman; W. H. Park, secretary; M. J. Rosenau, E. M. Houghton, Joseph McFarland, and H. D. Pease.

Work upon this subject has been carried on in the Antitoxin Laboratory of the New York State Department of Health for the last four years, and a method of testing the strength of tetanus antitoxin has been in use for two years, which is similar in most respects to that now adopted by the committee and made official for interstate commerce by the United States Public Health and Marine Hospital and for this State by the State Department of Health.

The old New York State unit was ten thousand times the least amount of serum necessary to protect from symptoms of tetanus, guinea pigs weighing from 300 to 350 grams, when injected with 100 times the minimum fatal dose of a standard liquid toxin for guinea pigs of the same size.

Average serums put out by the Antitoxin Laboratory contained from one-quarter to three-quarters of a unit per cubic centimetre. As the new unit is but ten times the least amount of serum necessary to save the life of the guinea pig against 100 minimum fatal doses of a precipitated toxin the old unit was approximately equal to 1,000 of the new units, and the serum issued by the New York State Antitoxin Laboratory therefore contained approximately 250 to 750 new standard units. It has been customary to distribute immunizing doses

*Bulletin N. Y. State Dept. of Health, February, 1907.

of 10 cubic centimetres of the weaker serums, and according to the new standard these doses therefore contained approximately 2,500 to 5,000 of the new units of tetanus antitoxin.

The committee have recently voted to reduce the amount of the minimum immunizing dose from 3,000 units to 1,500 units. Hereafter the immunizing doses issued by the Antitoxin Laboratory of this Department will contain 1,500 units of tetanus antitoxin irrespective of the amount of serum present in the vial. However, for the present at least, the amount of serum required will be less than formerly issued as an immunizing dose.

The therapeutic doses of tetanus antitoxin will contain 10,000 of the new units.

As the prophylactic doses of tetanus antitoxin which have been issued for the last two years contained a considerable excess over the 1,500 units now distributed as an immunizing dose and as the loss of antitoxic strength in tetanus antitoxin serum proceeds slowly, the doses formerly issued and not used undoubtedly still contain more than 1,500 units.

PROPHYLACTIC USE OF TETANUS ANTITOXIN.* Immunizing doses of 1,500 units should be administered to all persons who have been so injured that garden earth, manure, street dust, sand, or other dirt has been carried into the wounded tissues. Such persons are frequently infected with tetanus bacilli in this way and as the subcutaneous administration of a prophylactic dose of tetanus antitoxin is practically a sure method of preventing the development of tetanus intoxication in these cases, this procedure should always be followed. *Every person contracting a Fourth of July injury should receive as a part of the treatment of the case a subcutaneous injection of* 1500 *units of tetanus antitoxin.*

No instance of serious tetanus intoxication has ever followed this method of immunization in this country.

*Bulletin N. Y. State Dept. of Health, February, 1907.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES.

By F. H. Slack, M.D.

Assistant Director, Boston Board of Health Laboratory.

RESOLUTIONS REGARDING THE MILK SUPPLY.*—The Section on Public Health of the New York Academy of Medicine passed the following resolutions at its meeting of March 12, and these resolutions were adopted by the Academy at its meeting on March 21:

Resolved: (1) That the Section on Public Health of the New York Academy of Medicine does not believe in the necessity of the compulsory pasteurization of all of the milk supply of New York City, but recommends for the present to all those whose milk supply cannot be proven to be thoroughly inspected and wholesome, and mainly the milk destined for the feeding of infants, unless it is "certified," to boil their milk when delivered in the morning for three minutes.

(2) That the health of the city of New York demands a persistence in the policy of supervision of farms, dairies and creameries, supervision of the milk during transit and on delivery in the city, and supervision at the points of distribution in the city to the consumer, whether the milk that is distributed has been pasteurized or not.

(3) That local and state health authorities and the Bureau of Animal Industry of the United States Department of Agriculture should co-operate with milk producers to prevent the occurrence of communicable disease in cattle and their caretakers.

(4) That the Section on Public Health recommends that the New York Academy of Medicine adopt the above resolu-

*Medical Record, March 30, 1907.

tions, and that a copy be sent to the members of the Committee on Public Health of the Board of Aldermen, to the Committee of the New York State Legislature having under consideration the Reece bill, and to the medical and the lay press.

A NATIONAL HEALTH DEPARTMENT.*—In a paper read before the American Association for the Advancement of Science, at its last meeting, Dr. J. Pease Norton, assistant professor of political economy at Yale University, points out how little is appropriated from government expenditures for the preservation of the public health and advocates the establishment of a national department of health, with its head a cabinet officer, and gives rather elaborate details of the plan on which it might be organized. The economic reasons advanced for such establishment are:

(1) To advance the progress of society by the increased percentage of exceptional men in addition to the general increase of population. (2) To lessen the burden of unproductive years by increasing the average age at death; he figures that an increase of five years would save from $800,000,000 to $1,600,000,000 per annum. (3) It would also decrease the burden of death on the productive years. And (4) It would lessen the economic burden of sickness. Could the days of illness be cut down one-third a saving of nearly $500,000,000 could be made. It is estimated that $600,000,000 are now spent on criminality in the United States. If this is largely due, as is claimed, to social environment, such as overcrowding, alcoholism, etc., a fractional diminution would be of the greatest value.

At the meeting of the American Public Health Association lately held in the city of Mexico a strong sentiment in favor of a United States Department of Health was mani-

*Bulletin of the State Board of Health of Maine, January, 1907.

fested, and action was taken for forwarding this consummation devoutly to be wished for. The same kind of feeling was expressed by the Mexican and Canadian delegates, in regard to their own countries.

DOCTOR OF PUBLIC HEALTH.* The House of Delegates of the New York State Medical Society, Jan. 28, 1907, recommended that the Regents of the State University provide courses for and create the degree of Doctor of Public Health and that the State should enact a law making only such as have this degree eligible to appointment as Medical Health Officers.

MISUSE OF MILK CANS.† Massachusetts now has a law prohibiting the misuse of vessels used in the sale of milk and providing penalties in case such vessels are found to contain any offal, swill, kerosene, vegetable matter or other offensive material.

CALIFORNIA'S NEW HEALTH LAWS. The California Legislature, which has recently adjourned, passed pure food laws nearly identical with the national law. This legislature also passed an anti-spitting law and a law requiring the reporting, by physicians, nurses and others of all communicable diseases, including pulmonary tuberculosis.

A bill appropriating $2,000 to disseminate knowledge as to the best means of preventing the spread of tuberculosis awaits the Governor's signature.

ANTIVIVISECTION AGITATION IN ILLINOIS. Illinois is threatened with an antivivisection law, a bill to this effect having passed the Senate, April 10. It is to be hoped that the protests of all who are interested in the progress of our knowledge along those lines which have proven in the past to be of so great a benefit to both man and beast, will avail to defeat such legislation wherever it may be attempted.

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*Monthly Bulletin, New York State Department of Health, March, 1907.
†Laws of Massachusetts, Acts of 1906, Chapter 116.

REGISTRATION OF CASES OF TUBERCULOSIS. New York, The State of New York Department of Health, beginning with the first of this year, requires the registration of every case of tuberculosis.

ANTI-SPITTING LAW, VERMONT.* Vermont has passed an anti-spitting law with a fine of not more than ten dollars for each offence.

ANTI-SMOKE ORDINANCE, ATLANTIC CITY. Atlantic City, N. J., has an Anti-Smoke Ordinance which passed the city council Sept. 10, 1906, and was signed by Mayor Stoy, Sept. 17, 1906.

IMPURE ICE LAW, NEW YORK. New York has now before the Assembly and Senate Committees of Public Health an act prohibiting the cutting and sale of ice from impure or contaminated sources.

CLAMS FROM CONTAMINATED WATERS, MASSACHUSETTS. The Massachusetts Legislature has passed an act authorizing the taking from contaminated waters of clams and quahaugs for bait and providing heavy penalties if such clams or quahaugs are sold or exchanged.

MUNICIPAL SANITATION.

By Charles V. Chapin, M.D.

Superintendent of Health, Providence, R.I.

ISOLATION IN SMALL-POX TO BE ABANDONED.—The following resolution was adopted by the State Board of Health of Minnesota at its July meeting, 1906. Health

*Laws of 1906, Act No. 187.

officers elsewhere will anxiously await the results of this experiment in placing the responsibility for the extension of small-pox where it properly belongs, on those who refuse or neglect vaccination:

"It having been established that small-pox will not spread in a well-vaccinated community, and believing that all attempts to restrain small-pox in a community not protected by vaccination by means of quarantine will fail; that quarantine in a well-vaccinated community is unnecessary, that attempts to control the spread of small-pox by quarantine is unscientific, irrational, expensive, and misleading, that in laying down strict rules for the quarantine of small-pox, sanitary authorities are favoring unscientific and illogical methods for its control, and are conveying false ideas as to the safety of the public, the Minnesota State Board of Health advises that after January, 1908, further attempts to control small-pox in Minnesota by means of quarantine shall be abandoned."

TREATMENT OF CONSUMPTION AT A HOSPITAL FOR CONTAGIOUS DISEASES.—In 1902, Dr. Newsholme* began to receive a few tuberculous patients at the isolation hospital. Cases were selected which would probably be benefited by a few weeks' care and rest, so that they might then be able to return to work. The result has been very satisfactory and the number of patients treated has steadily increased, until in 1906, 181 persons had the benefit of the treatment. There is room for twenty-five patients at one time. The educational influence of this plan has been very great and Dr. Newsholme considers it the most important factor in the municipal control of tuberculosis. The tuberculosis pavilion is located about 100 feet from the diphtheria ward, and there has never been any cross infection, a fact which speaks well for the administration of

*Report of the Medical Officer of Health of Brighton, Eng., 1906, p. 76.

the institution. Brighton has a population of about 130,000. At North Brother Island in New York, there is a consumption ward parallel to and about thirty feet distant from a diphtheria ward, but no bad results ensue.

FOOD TO BE PROTECTED FROM DUST.—The City of New York has for some time had a provision in its sanitary code that no meat, fish, fruit, confectionery, bread, etc., should be offered for sale in the streets unless securely covered from flies and dust. But experience has shown that it is very difficult to enforce this regulation and that many fines and much confiscation has had little effect in reducing the number of violations.†

DISCHARGE OF DIPHTHERIA PATIENTS FROM HOSPITAL.‡—It is only within a year or two that the London hospitals have required negative cultures before the release of diphtheria patients. Dr. Turner states that of 1325 patients discharged under the new rule, sixteen apparently carried the infection to their homes, or 1.21 per cent, while of 1655 discharges before cultures were required, the percentage of "return cases" was 0.91.

NO DANGER IN SCARLET FEVER DESQUAMATION.*—Some of the London hospitals discharge their scarlet fever patients without any reference to desquamation, but all such require that there shall be no inflammation of throat, nose or ear. Other hospitals attach the greatest importance to desquamation and do not discharge a patient while it continues. Of 6164 cases sent from the latter class of hospitals, 3.97 per cent. carried infection to their homes. Of about 12,000 cases discharged from the

†Report of the Department of Health, 1904, I., p. 143.

‡Dr. Turner's Report to the Asylums Board on Return Cases of Scarlet Fever and Diphtheria in 1902-4, p. 20.

*Dr. Turner's Report to the Asylums Board on Return Cases in 1902-4, p. 6.

hospitals where no attention is paid to desquamation, and of which a large number were desquamating, 2.24 per cent. proved infective.

MILK NOTES.—The reports of the Board of Health of Montclair, N. J., always contain the results of the chemical and bacterial examination of milk samples from each dairy company, taken monthly. A short note is also added, giving some account of the way in which the dairy is managed. This seems to be an excellent plan for keeping the public informed as to the character of the milk supply and enabling them to select a good dairy man. It, of course, would not be feasible in a large city.

On April 6, 1904, an ordinance was passed by the City Council of Chicago which required that every can of milk brought into the city must be sealed by the shipper. It was believed that in this way responsibility for tampering with the milk could be more easily fixed. The results were very satisfactory, for it is stated that the watering of milk was reduced by at least 50 per cent. (Report of the Department of Health of the City of Chicago, 1904-1905, p. 17.)

SANITARY ENGINEERING NOTES.

By Robert Spurr Weston.
Assoc. M. Am. Soc. C. E.

REPORT ON POLLUTION OF THE WATER SUPPLY OF PHILADELPHIA BY COAL WASTES.*—In 1904, 5,809,000 tons of coal were shipped from the Delaware and Schuylkill watersheds, and 261,400 tons of coal dust were washed into these streams. The report of a commis-

*Engineering News, 57, 330.

sion appointed by Mayor Weaver discusses the general causes of pollution, the amount of coal dirt washed into the streams, and the methods for preventing the same. The pollution from coal washing plants and by the erosion of huge coal heaps alongside the streams is serious, though in some instances mining companies are intercepting the dust by subsiding basins. The present law is adequate to prevent pollution and better inspection is advised. The construction of sanitary sewers and an appropriation to cover the expense of forcing connection with existing sewers is also recommended.

STATE WATER SURVEY OF ILLINOIS.*—The Water Survey of Illinois has been in progress since 1895 and valuable data have been collected. Three bulletins have been published. The work was started under the direction of the late Prof. A. W. Palmer. The latest report, dated August, 1906, states that the Water Survey and the Board of Health of the state are co-operating in the work with the U. S. Geological Survey and the University of Illinois, the work being under four general subdivisions: 1.—Epidemics; 2.—Sewage Purification; 3.—Water Supplies; 4.—Streams. It reports a series of tests of the septic tank at Urbana, which is being operated under careful observation for the purpose of obtaining useful data. The total expenditure for the ensuing fiscal year for the study of the above problems amounts to $8,200, of which the U. S. Government contributes $3,000, the State Water Survey $3,200, and the State Geological Survey and the University of Illinois $1,000 each.

SEWAGE PURIFICATION IN WINTER.†—The author gives an account of his experience with sewage beds at Brockton, Mass., in winter. This is a very practical

*Eng. News, 57, 316.
†George E. Bolling, J. Assoc. Eng. Soc. 38, January. Eng. Rec. 55, 326.

paper, as it treats exhaustively of the methods employed to prevent freezing of the beds, including the furrowing of their surfaces and the systematic dosing of the same. The cost of furrowing and the degree of purification effected are also given.

MECHANICAL FILTERS OF THE WATER WORKS AT HARRISBURG, PA.*—This is an article describing a successful plant for purifying a rather difficult river water at a cost of $10.65 a million gallons. The system consists of subsiding basins, coagulating basin, filters and filtered water basins. Sulphate of alumina and soda are used as coagulants.

SEWAGE EJECTOR AT DULUTH.[1]—A description of a device for lifting sewage by hydraulic power.

COST OF A 66-INCH REINFORCED CONCRETE SEWER.[2]—Notes on the construction of a sewer at South Bend, Ind. The cost was $9 per lineal foot.

COST OF MECHANICAL FILTRATION AT BROOKLYN.[3]—Two of the Brooklyn sources of supply are purified by mechanical filtration. The plant at Baiseley's—capacity five million gallons per diem—furnishes water at a cost of $6.53 a million gallons, and that at Springfield—capacity three million gallons per diem—at a cost of $9.49. The former is operated at 80 per cent. of its capacity, the latter at 63 per cent. Sand filters would be preferable for the purification of the water which these

STATE CONTROL OF WATER SUPPLIES.[4] PENNSYLVANIA WATER SUPPLY COMMISSION.**—

*Eng. Rec. 55, 331.
1 Eng. Rec. 55, 336.
2 Eng. Rec. 55, 337.
3 Wagner and Coffin, Eng. Rec. 55, 342.
4 Eng. Rec. 55, 343.
**Eng. Rec. 55, 350.

On July 3, 1905, the Pennsylvania Water Supply Commission was appointed. Since this date 88 applications for the incorporation of water companies have been received, of which 37 have been approved, 9 disapproved, 20 are being investigated, and 2 were withdrawn. The commission has obtained many valuable data necessary to advise it of conditions of the water supplies of the state, including books, maps, blue prints, etc. The commission has diligently resorted to every available source of information. The act which established the commission was a very broad one, and it is now making a comprehensive study of the water supply with respect to:

1. Its natural condition.
2. As affected by population and manufactures.
3. As affected by appropriation for municipal and domestic purposes.
4. As affected by appropriation for water power and transportation.
5. As affected by obstructions to water courses.
6. As affected by forest cover, rainfall, floods, geology and topography.

The evident object of the act creating this commission was to confer upon a public body authority to preserve and equitably distribute the water supplies of the commonwealth for the common good of the inhabitants. It takes no account of the local distribution of the water; it goes to the source, and it is this that is to be preserved and equitably distributed. The powers which were conferred upon the commission are general and it is apparent that further legislation is needed to carry out the intent of the act, which aims to protect not only municipalities but also all users of water.

Among the subjects treated by the commission have been the obstructions to channels, due to the deposits of cinder, slag, earth and the like in them, and the build-

ing of wharves, embankments, dams, etc.; then again, the influence of the forests upon the flow has been studied, as well as the possibility of building reservoirs to conserve the flood waters, and in addition it aims to promote the proper development of the water power of the state.

The Engineering Record says editorially:

> It seems likely that before long the doctrine that the state owns the unappropriated water supplies within its boundary will not only be acknowledged generally, but will be the foundation upon which some sort of state control of the water supplies will rest, entirely apart from the control which is exercised as a measure to improve the condition of the public health.

It seems as if this was a step in the right direction, as it discusses not only public health but commercial problems, and is more likely to serve the interests of all the people than any special legislation. In this connection the editor notes that in New Jersey the powers of the Public Water Supply Commission have been increased. The most important feature of the bill is that all waters hereafter diverted in excess of the amount now being diverted must be paid for, whether diverted by a private person or a municipality. The highest court in the state has decided that all surface waters are the property of the state. The editor also asserts that it would be better if the authority of this New Jersey commission would be extended to include the use of water for power and industrial as well as municipal purposes.

LACTOSE BILE MEDIA IN WATER ANALYSIS.* —The author gives a further account of his favorable experience with this medium used for the classification of waters supposed to contain B. coli. "With its employ-

*D. D. Jackson, Eng. News, 57, 278.

ment more definite results on the sanitary quality of a water may be obtained than by any other test at present in use." It is also valuable for testing the efficiency of water purification plants.

TRICKLING SEWAGE FILTERS AT LAWRENCE.† —The author in a very carefully written article describes the operation of coarse grain filters at Lawrence for the past eighteen years and draws valuable conclusions from them. Among the subjects treated are the rates of filtration, the character of the sewage applied, the character of the effluent obtained, the character of the sediment in effluents, the storage of matter in filters, surface clogging, method of application of sewage, trickling filters in winter, materials for filling filters. Mr. Clark says that trickling filters are not a substitute for sand filters, which remove practically all the matters in suspension in sewage, but are simply devices for the quick oxidation of the putrefying matters in sewage, while allowing the larger body of stable or slowly decomposing matter to pass along with the effluent. It appears from the data, other things being equal, that the filters with as fine stone as will not clog are the most efficient. The degree of nitrification obtained increases rapidly as the depth of the filter increases, filters ten feet in depth producing an effluent containing at least four times as high nitrates as filters five feet in depth. The author believes that the device used at the Andover experimental filter of the Massachusetts State Board of Health, of which board he is the chemist, is the best means of applying sewage to trickling filters. The results show that it is feasible to operate trickling filters in eastern Massachusetts in winter, although all distribution devices would require more or less attention. For detailed data the reader is referred to the original article.

†H. W. Clark, Eng. News, 57, 397.

GARBAGE CREMATORY AT POST ONTARIO, N. Y.*—This article describes a satisfactory crematory designed to destroy eighteen tons of garbage in twenty-four hours.

RAILWAY WATER-SOFTENING.†—At the recent convention of the American Railway Engineering and Maintenance of Way Association, a committee reported on water service, especially water-softening. Two general types of softeners have been designed, the committee states, the continuous and the intermittent. A modification of the intermittent type is used on some railroads by utilizing the usual storage tanks for settling purposes. This practice is liable to provide too little time for reaction and subsidence prior to the water being drawn off into locomotives. The better designed of either of these types give good results. Practice has demonstrated that between three and four hours are necessary for the reaction between the water and the chemicals added to soften it. Water taken from running streams in winter requires a longer time for treatment. All softeners should be provided with some form of filter. Ample space should be provided for the accumulation of the precipitates.

THE PREVENTION OF STREAM POLLUTION BY STRAWBOARD WASTE.‡—This paper is an account of exhaustive experiments conducted by Professor R. L. Sackett of Earlham College, Richmond, Ind., and the author. Some idea of the extent of pollution of streams by waste liquors from strawboard factories may be gained from the statement that in 1900 over 10,239,000,000 gallons of liquor, containing about 184,700,000 pounds of straw and mineral matter and over 77,000,000 pounds of lime were discharged

*Eng. Rec. 55, 462.
†Eng. Rec. 55, 502.
‡Earle B. Phelps. U. S. Geological Survey, Water-Supply and Irrigation Paper, No. 189. Eng. Rec. 55, 497.

into the streams of certain states. The principal factories, 59 in number, are located within a comparatively small area. Indiana, Ohio and Illinois make about 80 per cent. of the strawboard produced in the country, and Indiana alone produces nearly 50 per cent. The present method of disposal of the waste is by preliminary sedimentation in open ponds. This method is unsatisfactory and unsavory. The author has shown by study and experiment that a short period of sedimentation, followed by mechanical filtration through sand without coagulants, will produce an effluent which can be discharged into most streams without producing a nuisance. Furthermore, the cost of this process is within reasonable limits. It is recommended that the sludge from the sedimentation tank could be dried or filter-pressed, and, it is stated, that some industrial use will be found for it.

BALTIMORE SEWERAGE WORK.*—Work on the new sewerage system is progressing at an unusually rapid rate. Over $3,000,000 worth of work has already been placed under contract, and $500,000 worth will be allotted soon.

CINCINNATI WATER PURIFICATION PLANT.†—This article is an excellent history and description of the Cincinnati Water Works, including a description of the purification plant, which is now being completed at an estimated cost of $6,500,000. This plant is to have a pumping capacity of 80,000,000 and a filter capacity of 60,000,000 gallons per diem. It will consist of settling reservoirs formed by damming natural ravines, from which the water will be led to the coagulation basins and filter plant. The settled water will be softened and coagulated before filtration by means of sulphate of iron and caustic lime. The softening and coagulation of the water will take place in two large coagulating

*Eng. Rec. 55, 436.
†Manahan and Ellms, Eng. Rec. 55, 430.

basins, from which the water is led to the filters, twenty-eight in number. Ample means have been provided for handling and feeding the chemicals used in the purification of the water, and the whole process is to be under the control of a laboratory. The filters are to be washed with water under greater pressure than has been customary heretofore, and a special strainer system is designed in accordance with these conditions. No compressed air or other mechanical device will be used to agitate the sand during washing. The strainer system includes a wire mesh screen placed between the gravel and the filter sand, of such a size that it would prevent the passage of the gravel upward but permit the passage of sand downward. This device prevents the displacement of the gravel during washing, and therefore the passage of sand to the screens of the strainer system. The filters are unusually large, each having a nominal capacity of 2,250,000 gallons per diem. For details of construction, etc., the reader is referred to the excellent original article.

HUDSON RIVER ICE SUPPLY.*—The quality of ice obtained from the Hudson River has been investigated by D. D. Jackson, Director of Laboratories, Department of Water Supply, Gas and Electricity of New York City. Less than half of the twenty-five samples collected were found to be good. The sources of contamination are chiefly the sewerage systems of various cities, especially Albany. The author believes that some of the typhoid fever must be due to the use of contaminated ice. Freezing eliminates many impurities, but does not render ice from contaminated water entirely harmless, especially when the ice is not stored before using, as is frequently the case along the Hudson river. Sewage, being warmer than water, floats, and the practice of flooding ice during the winter causes considerable sewage matter to be frozen into the ice. Sometimes this matter

*Eng. News, 57, 430.

occurs in layers distinct enough to be apparent to the eye. More stringent regulations are recommended,—among them the taking of ice from certain contaminated points,—for example, between Albany and a point five miles below, and in the vicinity of other large towns and cities. Ice should not be cut from contaminated sources if intended to be used for domestic purposes, and should be used for other purposes only under the supervision of the sanitary authorities.

WATER STERILIZING AND SOFTENING PLANT AT THE LEAVESDEN ASYLUM, ENGLAND.†—This is a device for softening the water by boiling with steam. It removes the temporary hardness only. The precipitate is deposited on trays similar to those used in a food water heater. The plant (capacity 260,000 gallons per diem), was installed with a guaranty that it would reduce the hardness from 19 degrees to 9 degrees, Clark's Scale, and that the difference in temperature between the incoming and outgoing waters would be less than 20 degrees F. With coal at $3.20 a ton, the cost of softening is about $25 a million gallons.

BOOK REVIEWS.

A Compend on Bacteriology. By R. L. Pitfield.. (*P. Blackiston's Son & Co., Philadelphia,* 1907.)

The attempt to condense a large subject into a brief compendium or "cram-book" is one of those things one is tempted to wish undone rather even than well done. To do it well requires complete knowledge of the subject-matter, rare judgment and discretion and much literary skill. Such a task Dr. Robert L.

†Eng. News, 57, 272.

Pitfield has attempted in "A Compend on Bacteriology." He covers in 222 small pages The Classification, Morphology and the Biology of Bacteria, Products of Bacterial Energy, Infection, Immunity, Bacteria, Animal Parasites, Study of Bacteria, Bacteriological Laboratory Technic, Antiseptics and the Bacteriology of Water, Soil, Air and Milk. None of these subjects are treated broadly so as to bring out their fundamental principles in a general way. In each case the author goes into most minute detail; and in so doing he displays considerable power of compact statement. The chapter on immunity, for example, is a remarkably clear summary for its brief compass. On a first glance the reader marvels at the mass of material compressed into such narrow space. If acquainted with the science of bacteriology, however, his wonder is soon directed rather toward the ease with which Dr. Pitfield settles vexed problems of bacteriology with a stroke of the pen. He learns for example that the flagella are without doubt or qualification a prolongation of the capsule, that "metals act as lethal agents in the presence of light and water, by forming metallic peroxides," and that the theories of Metchnikoff and Ehrlich, are "extremely ingenious and explain satisfactorily why certain bacteria are unable to infect the body" and later that "these theories make it clear to us why the body tissues during life do not fall an easy prey to many putrefactive bacteria, as after death."

Under scarlet fever he learns that Mallory assumed that the Cyclaster scarlatinae was the etiological cause of the disease (which he carefully refrained from doing). It is not surprising that when wandering afield into sanitary engineering Dr. Pitfield should make the erroneous statement that "sewage may be treated in sand filters or it may be run out on land where over 200,000 gallons may be disposed of on an acre of land a day." Chemistry, too, might be expected to be weak although the statement that fermentation is "the chemical transformation of carbohydrates by the action of bacteria, with the evolution

of CO_2, CO and H" is staggering. There is no excuse, however, for the following definitions from a bacteriologist:

"When bacteria exhibit many, or various forms, in the same culture, as does the typhoid bacillus, we speak of it as *pleomorphic* or pleomorphism. To elucidate: Man is pleomorphic, because among adult individuals some are tall, or short, fat or thin.

"It is common to speak of bacteria that differ from the adult forms, by reason of age and growth, as involution forms. To explain: Infants, children and those past puberty, but who have not yet become adults, are in a state of involution, or development."

Such extracts as these Job must have had in mind when he wished his enemy had written a book. It would be malicious to cite them if they were exceptional; but similar misstatements may be found on almost every page. The chapters dealing with laboratory technique are as bad as the theoretical discussions. The student who desires to make a water analysis is told to count the colonies on a gelatin plate which has been kept in "a cool, dry place" for "twenty-four to thirty-six hours." The indol test is to be made with "pure sulphuric acid" and sodium nitrate. Str. pyogenes is said not to ferment sugars while it is really one of the most active of acid-producing organisms. Even the method given for the making of ordinary media is antiquated and imperfect. Five per cent. salt and 10 per cent to 15 per cent. gelatin are to be added in nutrient gelatin, the acidity is to be adjusted without titration by adding 5 per cent normal hydrochloric acid and at the end "litmus, or lacmoid, or neutral red may be added to the gelatin as an indicator" (in gelatin be it remembered). Evidently the author is quite innocent of all acquaintance with the accepted standard methods.

It is altogether astonishing that so superficial and inaccurate a book should have been written by the pathologist to two hospitals and printed by a reputable publisher.

C. E. A. WINSLOW.

The New Hygiene: Three Lectures on The Prevention of Infectious Disease. By ELIC METCHINIKOFF. *With Preface by E. Ray Lancaster.* (*Chicago, Keener & Co.,* 104 *pp. Price* $1.00 *net.*)

This little book intended for lay as well as medical readers consists of three (Herben) lectures delivered before the English Royal Institute of Public Health. The subjects are drawn from the work on which Metchinkoff has been engaged for the last quarter century. The first lecture deals with "The Hygiene of the Tissues." Quite naturally the author seizes the opportunity to emphasize anew the importance of phagocytosis as *the* means of protecting the body against infectious disease. He discusses Wright's opsonic theory and triumphantly demonstrates to his own satisfaction that the opsonins are not essential bodies in phagocytosis since, if given time enough (2 hours) white corpuscles will show the same degree of activity against bacteria in physiological saline solution as against bacteria which have been acted upon by blood serum. He further states that even if the opsonins are essential bodies they are themselves products of the microphages and that therefore the microphages are the fundamentally active elements in the protection of the tissues. He quite properly lays stress upon the importance of recognizing the harm done in treatment by the use of the inhibitors of activity of the microphages, such as alcohol and quinine, it having been demonstrated that there is not only a diminution in phagocytosis in the presence of these substances, but also a diminution in the amount of protective humoral substances produced. The value of foreign blood sera such as horse serum (heated to 55 degrees C to prevent toxic action) as a means of increasing white cells and also their protective action is illustrated by reference to researches and results from practical hospital use.

The second lecture deals with "The Hygiene of the Alimentary Canal." In this the author treats broadly of intestinal in-

fection and specifically of the importance of animal parasites as introducers of infection. He evidently believes that intestinal worms are the means by which most appendiceal processes are brought about; this in spite of the fact that worms are found in a very small percentage of cases. He lays down a series of rules for sanitary living such as the drinking only of boiled water, the pasteurization of all milk ingested, the thorough cooking of all foods, with abstinence from raw vegetables and fruits or thorough scalding of their surfaces. He asserts that "no one can deny that a system based on the principles above laid down will insure the body against all sorts of diseases of the intestinal apparatus." With this, of course, one has to agree.

Reference is made to his researches in intestinal putrefaction and the value of the normal intestinal flora, notably the bacillus acidi lactici, in keeping down putrefactive organisms. The use of cultures of B. Acidi lactici in supplying intestinal needs in this direction, is recommended.

The third lecture is entitled Hygienic Measures against Syphilis. After a review of literature covering the incidence and manner of spread of syphilis, this lecture considers in some detail the results of inoculative work in monkeys and the use of antiseptics after suspicious exposure, the early work on both of these sides of the subject having been done in large part at the Pasteur Institute. The possibilities of producing a curative serum are definitely negatived. The possibility of attenuating the virus is suggested as a result of an accidental inoculation of one of the laboratory attendants with virus modified by passage through a macacus monkey. This virus produced a local sore on the lip, unlike the primary sore of syphilis yet teeming with spirochaetae. It was followed by no development of secondaries. Whether immunity against the unmodified virus was conferred or not is a question, inoculation with similar material by other observers failing to protect against the development of secondaries after the primary sore had appeared. For prophy-

lactic use after suspicious exposure ointments heavy with salts of mercury or similar agents are recommended, washes even with bichloride 1-2000 or the injection of similar solutions having failed to prevent the occurrence of a primary sore or the spread of the process.

The lectures are written in the fascinating style which makes non-scientific as well as for the scientific mind. They cover Metchinkoff's dicta on scientific subjects good reading for the much of the recent work in hygienic progress along certain lines. Throughout them shines the broad humanitarian spirit of the author, who has shown himself a fitting successor to Pasteur. Whether one agrees with all of his conclusions or not is a matter apart. This little book is recommended to all who would spend a few hours with one of the master minds of scientific medicine.

TIMOTHY LEARY, M.D.

Plaster of Paris and How to Use It. By MARTIN W. WARE, M.D., (*Surgery Publishing Company, New York,* 1907.)

There is probably no one material which could be spared from the surgeon's armamentarium with so great loss as plaster of paris. Common and cheap as it is, it is surprising how inefficiently it is used. This, combined wth the fact noted by the author of this little monograph, viz.: that the commercial preparations of plaster of paris are extremely imperfect, justifies the putting out of a book such as this is. Every surgeon should be familiar with the facts stated here, and few can read it and not glean valuable suggestions from its perusal.

In the first and second chapters the materials employed in the manufacture of plaster of paris bandages are discussed. Emphasis is laid upon the use of crinoline as the carrier of the plaster. Nearly all crinolines are sized with glue, and it is of the utmost importance that this should be washed out

of the mesh of the crinoline before it is used. The "Arawana" brand of crinoline best meets the requirements of a good bandage material. "Monarch" gauze is sized with starch. This makes a bandage which sets a little more slowly, but can take a higher finish and renders the splint more durable and will permit of the use of less plaster bandages.

The author justly claims that hand-rolled bandages are the best. There are, however, one or two good bandage rollers with which it is possible to roll loose and not too heavily-laden bandages. In practice, too little attention is given to the construction of "molded splints," to which the author refers. Plaster cream used to impregnate seamless tricot or stockinette makes it possible to construct light, removable, well-fitting splints to most any part.

The author's suggestions as to the protection of the operator, the patient, the floor, etc., while doubtless necessary, would have been better if supplemented by the remark that a really skilful handler of plaster of paris should be able to put on a plaster bandage without any such protection. Emphasis should be laid upon such dexterity. A practical point in the wringing out of bandages is to hold the ends of a plaster bandage forward against the palms of the hands. In this way plaster is not syringed out and wasted. Fraying of the ends will not occur if the gauze or crinoline is cut in the required widths by first pulling a thread.

The best protection for the skin and at the same time the material over which the most even compression can be effected is to be had by the use of unglazed sheet wadding. Tricot is good but not as good in cases of early fracture or where there is to be a long continuance of the plaster. The directions as to application and precautions would have been more complete had the author insisted upon the value of rubbing in the plaster of each layer of bandage as it is laid on. This adds greatly to the durability of the

bandage. Renewing as ordinarily employed in bandaging with a cotton roller or gauze is not to be recommended, but folding the entire width of the bandage upon itself enables one to ascend a truncated cone smoothly and to reinforce the bandage at the point most needing it without adding unnecessarily to the weight of the splint. Absorbing of excess of water by the application of towels during the process of setting hastens that process. The author utters no word of warning against the employment of more bandages than are necessary. The tendency among amateurs in the use of plaster of paris is to make their splints too heavy. Good practical suggestions are made as to the method of removal and the means for so doing. The most efficient method is by means of a sharp leather cutter's knife, cutting through a groove which has been marked in the cast and into which water has been dropped from a medicine dropper. The Gigli saws, lead strips to cut down upon, or fancy plaster shears or saws of any description, are only used by novices. Stern and Meisenbach have both prepared elaborate tables showing the way in which the tensile strength and the setting properties of plaster of paris may be influenced by the addition of various materials to the plaster. Their work should find mention in a consideration of this subject.

Chapters three and four are devoted to a consideration of the fractures to which plaster dressings are most applicable, and with the possible exception of seeming to advocate a rather too early employment of the plaster bandage in a class of cases where there is likely to be considerable swelling, which cannot be wholly accommodated within a plaster splint, the principles and suggested methods should meet with general acceptance. The author's method of fenestrating a plaster is a good suggestion and is eminently practical. Of particular interest were the

details of the use of plaster in fractures of the humerus and forearm near the elbow.

Chapter five deals with the methods of making moulded splints or splints made by impregnating hemp, tricot, flannel, etc., with plaster cream and shaping them to the parts which it is desired to fix. Numerous illustrations indicate clearly the many practical uses of this form of splint.

Chapter six treats of the use of plaster in orthopaedic surgery, describing in detail the suspension methods of applying plaster jackets, also the recumbent methods, both prone and supine. The feature which is most helpful in this connection, however, is the detail of making plaster beds and adding the head supports in cases of Pott's disease or torticollis where a plaster helmet is necessary in addition to the jacket. The method of securing further correction in club foot operations after the foot has been encased in a cast without removing the cast, according to the method of Wolff, is well illustrated.

The last chapter concerns itself with the uses of plaster in dental surgery, and though of no probable value to a skilled dentist, and no other would be tempted to resort to the use of plaster in such cases, its description here serves to round out the book.

The author has produced a helpful and timely little volume which should lead to the more skilled use of a very valuable material.

CHARLES F. PAINTER, M.D., Boston.

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G. M. Whitaker, 16.

Members are requested to send to the Managing Editor corrections or changes desired in the names, addresses or (where members are connected with a Board of Health) in the titles given in this list.

§Honorary Members.

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AMERICAN JOURNAL OF PUBLIC HYGIENE.

ERRATUM SLIP FOR MAY 1907 ISSUE.

VOL. XVII. May, 1907. No. 2.

"Present Status of Morphological Types of *B diphtheriæ*"—*Hill*

P. 158 line 10 for "from E1 to G2 should be excluded"
read "from D1 to G2 should be excluded

P. 162 lines 29-30 for "and E1 E2, F1 F2, G, G1 and G2 as negligible"
read "and D1 D2, E1 E2, F, F1, F2, G, G1 and G2 as negligible"

American Journal of Public Hygiene

AND

JOURNAL OF THE

Massachusetts Association of Boards of Health.

ORGANIZED 1890.

[The Association as a body is not responsible for statements or opinions of any of its members.]

All communications concerning the JOURNAL, copy, proof, subscriptions, advertisements, etc., should be addressed to the Managing Editor,

B. R. RICKARDS, 739 BOYLSTON STREET, BOSTON, MASS.

Vol. XVII. (New Series. Vol. III, No. 4.) August, 1907. No. 3

THE TRAINED NURSE AS A SPECIAL DOMESTIC SANITARY SUPERVISOR.

So much has been written regarding the vast variety of functions which a trained nurse should exercise that no originality can be claimed for a suggestion to specialize one of these for a single purpose, but an outline of one such usage foi public health purposes may be found useful.

In outbreaks of transmissible diseases, the nurse who is in attendance on the sick must guard and supervise the well also as a mere incident to the clinical nursing. But under certain circumstances, the sanitary supervising of the well becomes the primary requisite, sometimes without much, if any, demand for the nursing of the sick. These conditions may arise in small communities, where contact infection is obviously a leading or the only factor, and where at the same time the existing cases are for the moment chiefly convalescents or already sufficiently well nursed from a clinical standpoint, by

relatives or others, not especially trained. It often happens under such circumstances that a nurse may be engaged with advantage solely to circulate amongst the families where the affection exists or has existed, solely to observe, and insist on sanitary precautions for the protection of those not yet infected. Few trained board of health officials can afford the time, fewer still are able to associate sufficiently closely and continuously with the families concerned, to secure their patient minute detailed attention to every possible channel of infection. A trained nurse, charged with this duty alone, acting under authority from, and reporting to, the health authorities, can accomplish infinitely more than any number of printed or spoken directions, particularly if her visits are made daily for some time, and include inspections of the routine of the family life under the prescribed regime.

A case in recent public health practice may be quoted to illustrate the general principle, names, etc., being suppressed for obvious reasons. In a thriving country town of 2500, possessing two really good hotels, the matron of one hotel, having from twenty-five to one hundred guests daily, contracted typhoid fever. She was nursed by her husband, the chief clerk in the hotel, with some attendance from the dining-room girls. Three regular boarders came down, two of whom were nursed for a time at least in the hotel, their laundry being washed by the hotel laundresses and more or less of the necessary attendance furnished by the hotel "help." Of the dining-room girls, laundresses and other help in more or less contact with infected material, six came down with the disease. Guests from uninfected neighborhoods, taking meals at the hotel, also succumbed. Amongst others, the head dining-room girl, on whose remarkable energy and efficiency the commissarriat department seemed to pivot, became ill with typhoid. As soon as she recovered she at once went back to work. So with the day clerk. The husband of the first case became chef. The upset caused by the outbreak and inevitable short-

handed condition of the hotel staff subjected the hotel milk supply from day to day to the handling of anyone free enough at the moment to attend to it, instead of to the regular milk-handler. Notwithstanding that no actual cases existed in the hotel at the time when first investigated by the State health authorities, the fact that so many of those having to do with the food and coming into direct or indirect contact with the guests had recently suffered from typhoid fever, while those not so far sick had been emptying discharges, etc., of those who had been sick, constituted the hotel a public danger, because of the likelihood of contact infection, direct and indirect. But the life of the town centered very largely at this hotel. Great loss and inconvenience to the public as well as to the proprietors would follow if it were closed, and the other hotel, recently open, would have an enormous competitive advantage. It was not practicable to close it. To remove from the hotel those who were probably infective would be nearly equivalent to closing the hotel, since it would remove from the hotel its principal administrators, while, for the same reason, such a proceeding could only result in the other conditions becoming even worse than those already existing. It is hopeless to expect that mere instructions, no matter how detailed or how often repeated, would be faithfully and intelligently carried out even with the best intentions on the part of all concerned. The suggestion made above, regarding the use of a trained nurse for sanitary supervision, was followed out, there being no question that elimination of infection of guests and other dangerous contact was possible under proper precautions, rigidly carried out, without the suspension of the infected employees or the closing of the hotel. Either of the latter procedures would at first sight appear to be more efficient than that adopted, but unfortunately neither of them could well include any time limit, for it would be hard to say when the hotel might with safety be reopened or the suspension of the employees terminated. On the other hand the

services of the nurse might terminate at such time as observation should show that a routine of hand disinfection and other similar precautions had become recognized and established hotel habits, to be continued indefinitely, without supervision, until all danger had passed.

It is not impossible that a similar use of a trained nurse might be made in cases where infection amongst indispensable employees of other businesses involving close contact with the public obtain, although such is perhaps more likely to arise in hotels, institutions, schools, etc., than in other places, and with typhoid fever than with most other infections.

H. W. HILL.

THE AMERICAN PUBLIC HEALTH ASSOCIATION.

The American Public Health Association holds its next annual meeting at Atlantic City, N. J., Sept. 30 to Oct. 4.

Circulars calling attention to the work of the Association, to the Laboratory Section and to the new Section of Vital Statistics, have recently been received. Believing that among our readers there are undoubtedly quite a number actively engaged in public health work who do not belong to the A. P. H. A., we would call their attention to these circulars, parts of which are printed below.

(Circular Letter from Program Committee.)

To Laboratory Men Working in Public Health Laboratories.

The American Public Health Association, the only international public health association on this continent open to all professional hygienists, has from the first represented both the executive and technical phases of public health work, Federal, State and municipal. Under its auspices a committee was appointed in 1894 to formulate standard methods for

water analysis and in due course of time, as a natural outgrowth of this beginning, a Laboratory Section was formed in 1899 with the design of accomplishing for all lines of public health laboratory work what the widely known and accepted Standard Methods Committee has done so well for water work. A committee of the Section is now engaged in formulating standard methods for the bacterial examination of milk, perhaps the most pressing of the newer public health laboratory problems.

The American Public Health Association as a whole represents the science, art and technique of public health executive work; the Laboratory Section represents the science, art and technique of the test tube and microscope, as applied to the solution of public health problems. It is our desire to have as a member of this Section every practicing public health laboratory man, in order that this section shall be representative of the public health laboratory, which is nowhere else represented in this country. Such laboratories have problems distinct from those of the teaching laboratory. They have done excellent work, both routine and research. Certain lines of research can be done only in such laboratories and there is no question that they have an individuality of their own which justifies them in desiring definite representation in a society of their own. Such a society for public health laboratory men the Laboratory Section offers, with an already large membership of well known men and the additional advantage of close affiliation and contemporaneous meetings with the public health executives, for whom and through whom laboratory results are useful and effective in advancing public hygiene, as well as in every day routine.

Every public health laboratory man is invited to join the American Public Health Association and to become thereafter, without additional fee, a member of the Laboratory Section. Boards of Health are urged to see that their laboratories are represented by delegates at the Association meet-

ings. To become a member of the Association, make application to the Secretary of the Association, Dr. C. O. Probst, Secretary Ohio State Board of Health, Columbus, Ohio; two signatures of members are required for endorsation, but these are unnecessary in the case of delegates appointed by Boards of Health.

(Signed) F. C. ROBINSON,
C. O. PROBST,
H. W. HILL,
Program Committee.

(Circular Letter from Committee on Organization of a Section of Vital Statistics.)

At the last meeting of the American Public Health Association, in accordance with the request of many registration officials, the following resolution was adopted:

Resolved, That a committee of five be appointed by the President of the American Public Health Association to report on the organization of a Section of Vital Statistics at the next meeting of the Association, and that it be authorized to notify registration officials in the countries represented in the Association, particularly inviting their attendance at the next meeting, and to prepare a Constitution for approval by the Association and adopted by the Section at that time.

The Committee on Organization appointed to carry out the purpose of this resolution met at Washington in May, and formulated a draft of a Constitution, the first two sections of which are as follows:

Purpose of the Organization.

1. The purpose of this organization is to bring about a closer official and personal association of the registration officials of the several countries composing the American Public Health Association; to promote the introduction of effective

systems of registering vital statistics; to aid the adoption of uniform methods of collecting, preserving, correcting, and compiling registration records and of publishing the statistical data derived therefrom in the most useful form, especially for sanitary purposes; to conduct the active co-operation of the American Public Health Association with the Government agencies of each country and with other organizations interested in the improvement and use of vital statistics; to report on the actual condition of the International Classification of causes of death as employed in vital statistics, reports and bulletins, and to formulate recommendations for its deceinnial revision; to help in the better reporting and classification of the mortality of occupations; to present and discuss papers relating to vital statistics both in the Section meetings and in the general sessions of the American Public Health Association; and in general to promote a proper appreciation of the necessity and importance of vital statistics as an absolutely essential basis of modern public health work, and to improve the character and status of registration service.

Membership.

2. Registration officials and other workers in vital statistics who are members of the American Public Health Association shall be eligible to membership in the Vital Statistics Section.

The above extract, which is subject to approval by the Association and Section, shows the general scope of the movement as understood by the Commttee on Organization. Your attendance is earnestly requested at the *first meeting* of the Section, which will be held in connection with the Thirty-fifth Annual Meeting of the American Public Health Association at Atlantic City, New Jersey, beginning on September 30 and ending October 4, 1907. A circular will be sent by the Secretary of the Association giving full information in regard to reduced railway fares, accommodations, etc. It is expected

that the first Section Meeting will be held on Monday, September 30, when the preliminary organization will be effected.

In addition to organizing, it is planned to begin the active work of the Section at this meeting, and papers, questions, and suggestions on various phases of vital statistics, and especially relating to the practical side of registration work and the sanitary uses of mortality statistics, are requested. They may be sent to Dr. Cressy L. Wilbur, Bureau of the Census, Washington, D. C., who will provisionally act as Secretary of the Committee.

There is a large field of usefulness for this Section, and it should have the enthusiastic support of all registration officials and users of vital statistics. If you cannot be personally present at this first meeting, or send a paper or suggestions, please let us know that you are interested in the movement and will, at least, be with us in spirit. Sincerely,

(Signed)

J. N. HURTY, Chairman,
CRESSY L. WILBUR,
JOHN S. FULTON,
JESUS E. MONJARAS,
CHARLES A. HODGETTS,
Committee.

DIPHTHERIA, SEWER GAS AND INFECTION.

In the February number of this Journal, a circular or pamphlet on "Diphtheria: Its Prevention, Restriction and Suppression," issued by the Illinois State Board of Health, was reviewed by the writer of this article.

In the May-June number of the Bulletin of the Illinois State Board of Health we find the following:

"Dr. Samuel H. Durgin, the distinguished editor of The American Journal of Public Hygiene, and Journal of the Massachusetts Association of Boards of Health make the follow-

ing comment on the circulars of diphtheria, scarlet fever and typhoid fever, recently issued by the Illinois State Board of Health:

'The State Board of Health of Illinois has recently issued pamphlets bearing the above title. Similar pamphlets have also appeared on scarlet fever and typhoid fever. This literature is written in clear, concise language and is sufficiently free from technicalities as to render it easily understood by the laity for whom it is evidently intended.

The education of the people along such lines as these is a step in the right direction and the advice given is, on the whole, excellent. Particularly good is the admonition to call the physician without delay in all doubtful cases and the statements regarding the benefits of the early use of antitoxin.'

Continuing, the reviewer offers the following criticism which, in view of existing opinions of those presumed to be most conversant with matters of public health, is read with a certain degree of surprise:

'It is somewhat to be regretted that the author of these pamphlets has called particular attention to sewer gas as a cause *per se* of infection, since experiments within recent years by competent workers have shown the air from sewers to be practically free from bacteria of any kind. Were it in fact true that disagreeable odors were carriers of infection, the people themselves would take more interest to learn how best to avoid infection.'

'It is also our opinion that too much attention has been called to filth and its effect in lowering vital forces so that the body becomes more susceptible to disease. While this is true in a degree and while it is desirable to get rid of filth for good reasons, we believe it positively harmful to so emphasize these points as to distract attention from what is the more usual channel of infection—direct contact.'

It is doubtless true that the public should be advised that the chief means of spread of diphtheria is by direct contact, but at the same time the "experiments made within recent years by competent workers" have not sufficiently convinced us that other factors of propogation are to be entirely ignored. It is entirely proper to lay our heaviest defenses in the way of the major danger, but our efforts will not be productive of the best results if we ignore the minor forces of the enemy.

The relationship between decomposing animal and vegetable matter and filthy and unprotected sewers and drains with outbreaks of diphtheria, is unqualifiedly admitted by Welch and Schamberg, who say that "it cannot be denied that the emanations from such a source act as a predisposing cause to precipitate an attack when the diphtherial entity is present." Northrup, in Nothnagel's Encyclopedia of Practical Medicine, names defective drainage, decomposing substances and sewer gas as exciting causes of diphtheria when the Klebs-Loeffler bacillus is present. Harrington recognizes the association between diphtheria and unsanitary conditions, faulty drainage and defective sewage, although he holds that these factors predispose to diphtherical infection through their depressing effect upon the vital functions and the general health. Rohe holds that foul air is productive of general deficiency of nutrition with diminution of resistance to disease, and calls attention to the unquestionable outbreaks of infectous maladies on account of the escape of sewer-air into inhabited rooms—although he, like all others, admits that the specific organism of infection must be present.

When we consider that the Klebs-Loeffler bacillus is frequently present in the throats of healthy individuals who resist their invasion through active vitality, we are brought face to face with the proposition that, in case the bacillus is present, the determining factor as to whether diphtheria will or will not occur is the presence or absence of those conditions recognized as lowering the resistence to bacterial invasion. Inci-

dentally, it has not been the contention of the Illinois State Board of Health that sewer gas or filth do more than to "favor the spread of disease" and we believe that this contention has never been successfully disputed.

But turning to the "experiments made in recent years by competent workers," we find evidence which would warrant even a more positive stand on the subject of the dangers of sewer-gas, than has been taken in the publications of the State Board of Health. In the Journal of the American Medical Association for June 22, 1907, the experimental work of Horrocks is dwelt upon editorially and the conclusion is reached that there is danger of the actual spread of specific infectious disease through defective sewers. The editorial is well worth quotation in full:

> *THE POSSIBILITY OF INFECTION FROM SEWER PIPES*: It was a common theory twenty years ago that infectious diseases were spread by sewer gas, and outbreaks of diphtheria and other infectious diseases were attributed to improper drainage and the escape of noxious gases into the sleeping apartments of those attacked by the diseases. With the demonstration of the germ theory of the infectious diseases the idea of the action of sewer gas in their production was gradually abandoned, as well as the theory of the causative influence of emanations from the soil. The theory of the causation of infectious diseases by fomites, however, persists. Recently Horrocks (Proceedings of the Royal Society, lxxix, B 531) has instituted some interesting experiments to determine whether the air of drains and sewers may be infective. In a first series of experiments he worked with sewage in a closed vessel, and found that the bursting of bubbles of gas, in the absence of currents of air passing through the apparatus, was not sufficient to infect the air of the container. He used *Bacillus prodigiosus*, *Bacillus typhosus* and *Bacillus coli communis* in his experiments.

When, however, he used an apparatus in which there was a circulation of air, he found that the bursting of gas bubbles was sufficient to infect the air of the system. If the sewage was infected with a known organism, Petri dishes, suspended at various levels above the surface of the fluid in the system, became infected in a varying length of time after they were placed in position. Further experiments showed that the separation of dried particles from the walls of the pipes of a sewage system and the probable ejection of minute particles from flowing sewage might infect the air of the system. In order to prevent the passage of microorganisms into the house drainage system from a main sewer, thus infecting the air of the house, a disconnecting trap is necessary. In an interesting series of experiments made with actual sewage systems of a house and a military hospital it was shown that the organisms might be carried from the sewage to the air inlet of the system. Indeed, the air inlet was shown to be a source of danger of infection even when the inlet was protected by a mica valve, particularly when the inlet was placed at about the ground level. These experiments seem to show that there is danger of actual spread of infectious material by badly constructed sewerage systems, apart from the recognized danger of depression of the resistance of the individual by inhalation of the noxious gases liberated.

It would seem that this is one of the cases in which the pendulum of professional and scientific opinion had swung too far. The doubt occasioned by the advanced idea of bacteriology caused many to deny the importance of the other factors in the spread of disease, without considering that the specific microorganisms might be the active agents in those agencies formerly to be potent in the spread of disease."—*From the Illinois State Board of Health Bulletin for May-June.*

While it is not our purpose to enter into any extended discussion with those whose opinions may not agree fully with ours it seems well in this case to quote certain passages from the pamphlet in question and then let our readers judge for themselves whether or not we were justified in our criticisms. (Italics in every case ours.)

Quotations from Illinois State Board of Health Circular on

Diphtheria:

"Filth plays a very important part in the spread of diphtheria, for unsanitary conditions tend to lower vitality, and in consequence to increase the susceptibility to the disease. *There is no doubt, also, that sewer gas is a carrier of diphtheretic poison and that many outbreaks hence hold close relationship with defective drainage, sewers and cesspools.*" (Page 1, Diphtheria, its Prevention, etc.)

"Whenever diphtheria exists in malignant form *there will generally be found some obvious cause, such as accumulation of filth, unclean cellars, foul gutters or cesspools or overflowing privy vaults.*" (Page 2 of pamphlet.)

The language in which the above quotations are couched would unquestionably make even the most intelligent member of the laity believe that the writer of the pamphlet meant to infer that sewer gas, filth, etc., are causes *per se* of infection, an interpretation that the editor of the Bulletin now distinctly states (Vol. 3, No. 5, page 204) that he does not wish taken.

With the possible exception of the last reference (Horrocks) we have not questioned the statements made relative to filth as a predisposing agent and fail to see wherein our review disputes in any way the opinions of these gentlemen. It is well known that the workers in the great sewers of Paris and London are healthy men. Horrocks' article which appeared on this continent first in Nature sometime subsequent to the publication of the review in question, might appear to cast a

different light on the subject of the possible transmission of typhoid by means of sewer gas. We prefer to wait for results by other experimenters along this line before changing an opinion on a single set of results which so radically differ from much that has been published. We would also refer to the opinions of Dr. Chapin on this point.*

Admitting for the sake of argument that there is a slight possibility for the transmission of sewage organisms by sewer air we must still call upon our critic for any evidence tending to show the presence of diphtheria bacilli or "diphtheretic poison" in sewage. As for filth, there is available evidence† to show that diphtheria bacilli tend to die out rapidly outside the human body.

In conclusion we still believe that the language employed in the pamphlet was such as to perpetuate the common idea of the transmission of diphtheria in particular and other diseases in general through sewer gas and fomites, that an otherwise excellent article was rendered of doubtful value, and that it is "positively harmful to so emphasize these points as to distract attention from what is the more usual channel of infection—direct contact." ‡

B. R. RICKARDS.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

The quarterly meeting of the Association was held, by the courtesy of the Boston Board of Health, at Gallup's Island, Boston Harbor, on Thursday, July 25, 1907. Members were conveyed to and from the Island by the steamer "Vigilant." Before landing there they visited the Boston Floating Hospital, which was moored at the wharf.

Dinner was served at 1.15 P. M. It was followed by a

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*This Issue, Page 296.

†Annual Report.

†Boston Board of Health, 1902, page 70.

†Boston Board of Health, 1905, page 77.

‡This Journal, Feb. 7, 1907, page 130.

business meeting held under the presidency of Dr. Henry P. Walcott.

The records of the April meeting, which was held at the Hotel Brunswick, Boston, were read and approved.

The following members were elected, upon recommendation of the Executive Committee:

J. Porter Russell, of the Cambridge Board of Health.

Dr. George C. Anthony, Chairman of the Wellesley Board of Health.

Dr. Sylvester F. McKeen, of Allston.

Dr. George F. Hart, of the Webster Board of Health.

Dr. O. A. Bemis, of the Whitman Board of Health.

George A. Edison, of the Whitman Board of Health.

Lucius Cook, of the Whitman Board of Health.

David Craig, of Boston.

Alfred M. Russell, of the Newton Board of Health.

Dr. James Knight Wardwell, of the Norfolk District Milk Commission.

Dr. David C. Dow, of the Cambridge Board of Health.

RECENT PUBLIC HEALTH LEGISLATION.

By Dr. Henry P. Walcott, President Mass. State Board of Health.

The first business of the afternoon appears to be an address by Henry P. Walcott, President of the State Board of Health, on Recent Public Health Legislation. What I have got to say does not deserve to be dignified by the title which has been given to it. There is one topic that I wish to speak upon, and but one. The far greater subject, that of the very important work in legislation effected by this last Legislature, will be far better spoken of by the man who is more responsible for it than anybody else, Dr. Wheatley, and I hope the Association understands how valuable the service rendered by Dr.

Wheatley has been in the Legislature. (Applause.)

The measure which I am going to speak about is Chapter 537 of the Acts of 1907. It is an act to provide for the establishment of health districts and the appointment of inspectors of health. It is really only a portion, an important portion, I think, of our public health service, and is practically the stone which completes the arch of our public health system in the Commonwealth, but it is after all only a portion of the public health service. It is an attempt to bring the powers of the State into the service of the municipalities of the Commonwealth, to bring it nearer to the people of the Commonwealth.

Boards of health have always existed in some form or another. We are inclined to think in Massachusetts that the practical idea of a board of health had its origin in the year 1869. That is not at all true. There was certain legislation in 1869 which brought the State Board of Health, the first State Board of Health in the country, into existence, but there had been all sorts of boards of health before that. In fact, in one form or another there had been boards of health ever since the medical profession has existed. The early Greek physician, Hippocrates, himself was a professor more of preventive medicine than of curative medicine. He was consulted by the public authorities, and his advice was acted on by the public authorities. Various of the European governments, of course, created certain forms of public health authorities centuries ago, but a real public health authority owes its origin, it seems to me, to two distinctly modern movements: (1) to the increasing benevolence of the world, the increasing desire to do something for your neighbor, the desire which has a magnificent monument in that steamer which we saw on our way down here, a kind of benevolence which did not occur to the people of two generations ago, and yet a most effective form; (2) to the growth of scientific knowledge as to what medicine can actually do.

When all that a physician could do was to relieve the discomforts of an individual, knowing very little about the thing

that afflicted that individual, it was perfectly evident that the State could accomplish very little, and there is no better illustration of what that really means than the one disease, yellow fever. Historically we know that Boston was twice emptied of its inhabitants by yellow fever, the last time in the year 1813. It was an unknown terror. People knew nothing about it, except that a certain dreadful thing had appeared in their midst, which killed people. The physicians could not cure it, and there was absolutely no means of dealing with it. They fled from it, and they fled from it down to our own immediate close recollections. We remember the condition of things in Memphis in 1879, an absolutely terror stricken community during the epidemic and after the epidemic. When the last epidemic of yellow fever occurred in Mississippi the State government and the whole social order nearly disappeared, and there was scarcely a semblance of State government left. A scientific discovery has shown that that disease, perhaps, is vastly more easily controlled than typhoid fever. There is absolutely no reason why any community should be terror stricken by it. There is every reason why the community should place in the hands of somebody almost absolute power for, in the first place, taking the man who has yellow fever and so secluding him that the mischief-making insect cannot come into contact with him, and so protecting well people that the insect that is infected itself cannot come in contact with them. It is the simplest possible problem, and it justifies any amount of legal interference on behalf of the community as a whole. That thing has gone on, and it will go on indefinitely. So that the community is now justified by ample scientific knowledge in erecting all sorts of barriers, and it does not need a man of my age to predict, certainly the youngest man here can predict it as surely as I can, that the number of diseases so treated is going to increase enormously in the future, and the powers of the Commonwealth are going to be invoked to a much larger extent than they ever have been invoked.

In 1850 a very remarkable report was presented in the Massachusetts Legislature, the best public health document ever written in Massachusetts, one of the great documents of the world. That was a report written by Lemuel Shattuck and presented to the Legislature of 1850. Lemuel Shattuck was not a physician; he was an extremely intelligent layman. He made a sanitary survey of the State of Massachusetts, and he recommended not only a State Board of Health, he recommended far more efficient local boards of health than we had ever had. He also recommended some intermediary between that State Board and the local boards. He was too early for his time, and the people of Massachusetts waited nineteen years—or more exactly, eighteen years—until they created a State Board of Health. They did not meddle with the organization of the local boards of health, and it would probably be difficult even now to effect any very great changes in the organization of the local boards of health, some of which are very good, and some of which only exist in name.

Having got to his point of a central body possessed of a good deal of information, of local authorities in some cases possessed of no satisfactory information, how are you going to make the resources of the State available? That was the question that came years ago before the State Board of Health, and they eighteen years ago attempted to get some legislation which would give them a body of health inspectors, men who should stand between the authorities of the State House and the municipalities of Massachusetts. It excited certain jealousies, naturally, local jealousies, and the legislation was not at that time effected. It has had greater or less success; sometimes it has passed a Legislature, sometimes it has passed a Senate, but it never became a law until this year. Fortunately this year there were several influences that affected the legislative mind. One of them was a very strong organization of those who were interested in the measures for the prevention of the spread of tuberculosis. Another was a very earnest body of workers in the community who wished

to see a better care exercised over minors working in manufacturing establishments, and a better inspection of the conditions under which men labored. The result of all that was the legislation to which I have referred, Chapter 537 of the Acts of 1907, which reads as follows:

Section 1. The State Board of Health shall, as soon as may be after the passage of this act, divide the Commonwealth into not more than fifteen districts, to be known as health districts, in such manner as it may deem necessary or proper for carrying out the purposes of this act.

Section 2 provides for the appointment of the inspectors. These inspectors, it should be said, are appointed by the Governor; the Board of Health has nothing to say about the appointments.

Section 3. Every State inspector of health shall inform himself respecting the sanitary condition of his district and concerning all influences dangerous to the public health oı threatening to affect the same; he shall gather all information possible concerning the prevalence of tuberculosis and other diseases dangerous to the public health within his district; shall disseminate knowledge as to the best methods of preventing the spread of such diseases, and shall take such steps as, after consultation with the State Board of Health and the local State authorities, shall be deemed advisable for their eradiction; he shall inform himself concerning the health of all minors employed in factories within his district, and, whenever he may deem it advisable or necessary, he shall call the ill-health or physical unfitness of any minor to the attention of his or her parents or employers and of the State Board of Health.

The fourth section simply provides that the inspectors shall be under the general supervision of the State Board of Health and shall perform such duties, 'other than those hereby imposed upon them," as the State Board from time to time shall determine.

Then the sixth section transfers to the State inspectors of health, under the direction of the State Board of Health, and in place of the inspection department of the District Police, certain provisions of law now in existence with regard to the protection of the working classes.

The important thing, it seems to me, in general terms about that legislation is that it is advisory legislation. The factory legislation that has been transferred to these inspectors is, in many cases, an executive office. The inspector uses powers which formerly belonged to the inspectors of the State Police, but the more general functions of these inspectors are advisory functions, and it seems to me that in this case the Legislature has shown great wisdom. It is not the business of this inspector in the Worcester district, in the Hampden district, in the Essex district, or in the Berkshire district, to exercise any autocratic authority over the local authorities now in existence in charge of health maters. It is his business to assist them. It is his business to inform them, if necessary. It is his business to bring the authorities of neighboring communities into co-operation. It is his business to properly inform the authorities at the State House that there are things here which only the State authority can deal with. He is to be the next friend of the local health authorities, and exactly in that way he is going to accomplish all that it is impossible to designate by any words of a written statute. He has got to exhibit himself as an individual of knowledge, of tact, and of perseverance. It is not the work of a day, it is not the work of a month, it is hardly the work of a year; but I believe, after meeting the gentlemen whom the Governor has appointed to these very responsible positions, that the State is going to get an ample return for any moneys that it may have appropriated for the purpose; I believe that the public health in Massachusetts, as a result of this legislation, is going to be better protected, and I believe that we are going to know more about the conditions

under which our people live. I think we are going in consequence to be able to provide better conditions for them, because the power of the State Board of Health under this new act is, after all, only an advisory power. We have the power, fortunately, and it is an enormous power, of reporting to the Legislature of Massachusetts, of reporting to all the people of Massachusetts through the Legislature, and I don't believe there is a single community in Massachusetts, from Boston down to Gay Head, or some other small community, which does not respect the public opinion of Massachusetts. I believe it always has controlled the State, I believe it always will control the State, and I believe in the hands of the gentlemen appointed to the most honorable offices it is going to be well exercised. (Applause).

I have now great pleasure in introducing to the Association Dr. Wheatley, to whose good services we owe our health legislation. (Applause).

RECENT PUBLIC HEALTH LEGISLATION.

By Dr. Frank G. Wheatley, Senator from Plymouth County.

Mr. President: It is with a good deal of embarrassment that I rise to-day to talk to you a moment after the very flattering, and I am sure, too kind words of your Chairman. The fact of the matter is, gentlemen, that in Massachusetts the State Board of Health is the power behind the throne. I don't mean by that that that power is exercised in any autocratic or unjust way, but in the mind of your chief executive and in the minds of your legislators, and I believe in the mind of every thinking man in the Commonwealth, the State Board of Health of Massachusetts is considered authority on matters affecting the public health, and so when it becomes known that certain measures are looked upon with

favor by the State Board of Health a man has to have a good deal of termerity to get up in the House or Senate and openly oppose such measures. Our State Board of Health, gentlemen, is altogether too modest a body, in that it refrains very carefully from interfering with legislation. I have repeatedly been to the executive officers of your Board of Health and said to them that such things and such things were under discussion, and while they might intimate to me personally that perhaps it might be wise legislation, they were very careful that the Legislature as a whole did not get an idea that they were dictating legislation.

I feel as if your Chairman had outlined by far the most important act that passed the last Legislature. I have not attempted to prepare any formal address on this occasion, but gathered from the invitation I received that it was the wish of the President of the Association and of the Executive Committee that I present to them in a brief way the actual results of medical legislation during the last year, and that I shall attempt briefly to do.

The Great and General Court recently prorogued was fruitful in medical legislation. It is my purpose to give to you a resumé of recently enacted laws and also call your attention to proposed legislation which fell by the wayside. Before doing that, however, I want to urge upon every member of this Association the importance of keeping in constant touch with medical legislation. It is my honest conviction, based upon three years of experience upon the Committee on Public Health, that the medical profession of the State can absolutely control legislation of this kind. It is only necessary for us to act unitedly, sensibly, and energetically to secure this end.

If I may be allowed a personal word, I want to say that I have felt fully as much satisfaction in working to prevent the enactment of laws as in any part that I have played in constructive work.

The General Court is a crude machine from which to grind out health regulations. It is a matter of common observation that men whose judgment is excellent on most subjects are often misled on matters medical.

I had a very striking illustration of that the other day. I was talking with a lawyer of prominence, whose name you would recognize if I should mention it, who gave me an account of a European trip that he had recently taken, and who said that while travelling in Italy his daughter was taken sick with tonsilitis, I think, and he had the good fortune to call the most distinguished physician in Italy. He said that physician was a man who held a high position in one of the leading medical schools in Italy, and was a most charming man personally and was an authority on all medical subjects Curiously enough he found out that the man was an anti-vaccinationist, because he had made a personal investigation of the subject and knew what he was talking about. It also developed farther that the physician had a method of his own for the treatment of tuberculosis. This prominent lawyer of Massachusetts told me in all good faith that this man brought germicides in direct contact with the germs that caused tuberculosis, and destroyed them in the living tissue, and his cures were so complete and so rapid that many of his patients did not believe they had tuberculosis at all; but he knew they had it, because he had absolutely made the diagnosis himself. I cite that to illustrate how men who are leaders in certain lines of work are mislead on matters medical. This lawyer believed that he did have a man of extreme scientific learning, and a remarkable physician, to treat his daughter, as he undoubtedly did. (Laughter.)

If we could by general law delegate to competent boards of health all medical regulations and stop piling Pelion on Ossa in the shape of specific laws, I am sure the Commonwealth would be the gainer, but unfortunately health boards are not always competent, and under our form of government

every man with a "hobby" has the right to embody it in a petition and bill, and no matter how crude the proposition, it stands a fair chance of being enacted into law.

A position on the Public Health Committee is not exactly "a bed of roses" for a medical man. You are quite apt to be told by petitioners, members of the Legislature and even by members of your own committee that your efforts for or against certain bills are based on financial reasons, that you favor vaccination laws, medical inspection laws, etc., because it means more money for the doctor; but such criticism is the exception rather than the rule. The average legislator is not so bad a fellow after all, and if he errs in his vote, the error is usually one of the head rather than the heart.

The acts that have a special bearing on the public health passed this year are as follows, the chapter in each case being of the Acts of 1907:

Chapter 138 provides that a body shall not be cremated within forty-eight hours after death, excepting death from contagious diseases, and when the death occurs within the Commonwealth, it shall not be received by any corporation authorized to cremate until its officers have received the certificate required by law before burial and a certificate from the medical examiner. When death occurs without the Commonwealth, the reception and cremation of the body shall be governed by such regulations as shall be made by the State Board of Health.

Chapter 164 provides that every person, firm or corporation operating a factory or shop in which machinery is used for manufacturing purposes shall maintain, free of expense to employees, a medical or surgical chest approved by the local Board of Health.

That provision, approved by the local Boards of Health, was added after the bill left the Committee on Public Health,

and in the minds of some makes the law perhaps permissive rather than obligatory.

Chapter 180 prohibits the free distribution of samples of drugs containing poisons or any other injurious ingredients. That bill was introduced by Senator Hayes of Springfield, and to my mind was wise legislation.

Chapter 183 provides more appropriation for inspectors of foods and drugs.

Chapter 215 provides that certificates of exemption from vaccination shall state the cause of exemption. That was the outcome of an attempt to secure a bill to provide that certificates of exemption from vaccination should be supplied by the school physician. That brought out all the long-haired fraternity from Berkshire to Cape Cod, and we had quite a stormy session. It was felt that perhaps it was not wise to stir up vaccination matters too much, in view of the fact that apparently we were getting fairly good results from our present laws, so that simple provision, that the exemption certificate should state the cause of the exemption, was added to the present law.

Chapter 216 that cream offered for sale shall contain not less than 15 per cent. of milk fat. I don't know whether that is really a health regulation or a food regulation.

Chapter 243 requires that boards of health, corporations and persons having any knowledge of or reason for suspecting contagious diseases among domestic animals shall give notice to the Chief of the Cattle Bureau of the State Board of Health. That to my mind is pretty important legislation, if it is lived up to.

Chapter 259 provides that proprietary or patent medicines shall be so labelled as to show the quantity of alcohol, morphine, codeine, opium, heroin, chloroform, cannibis indica, chloral hydrate, acetanilid, or any derivative or preparation of such substance.

Chapter 267 provides that neither women nor minors under eighteen years of age shall be employed in textile establishments before six in the morning or after six in the evening. That came from the Labor Committee, and is the much advertised Overtime Bill. It was strongly urged by the labor organizations as a health measure.

Chapter 285 exempts from penalty the sale by wholesalers of fruit and vegetables when the partially decayed condition of such articles is made known at the time of sale. It was found that under the law a man who had a case of oranges, for instance, partially decayed, which he sold to a retailer with the statement that they were decayed, was breaking the law.

Chapter 386 provides that reasonable expense by the Board of Health of a city or town caring for persons inflicted with diseases dangerous to the public health shall be paid by such person or his parents, if able, otherwise by the city or town where he has a legal settlement, or if he has not a legal settlement, by the Commonwealth. Any person incurring public expense in consequence of small-pox, scarlet fever, diphtheria, tuberculosis, dog bite requiring the anti-rabic treatment, or other diseases dangerous to the public health, shall not be deemed a pauper by reason of such expenditures.

Chapter 410 prohibits expectoration on any public sidewalk or any place used exclusively or principally by pedestrians, or, except in receptacles provided for the purpose, on the floor of any city or town hall, court house, public library, museum, church, theatre, lecture or music hall, mill or factory, or hall of any tenement building occupied by five or more families, school building, ferry or steamboat, railroad car (except smoking car), street railway car, railroad or railway station, or waiting room, or sidewalk or platform connected therewith. A very comprehensive anti-expectoration law.

Chapter 445. Wage earners held in quarantine shall be

paid by the city or town three-quarters (3-4) of their regular wages, not to exceed $2.00 per day.

Chapter 467 provides that the State Board of Health may delegate local boards power to grant permits in regard to ponds and streams used for public water supply.

Chapter 474 provides for the construction of three (3) tuberculosis hospitals, trustees to be nine (9), one representing the State Board of Health, one representing the State Board of Charity and three from the Rutland Board. That Board has already been appointed by the Governor.

Chapter 480 provides for the notification of the presence of diseases declared by the State Board of Health to be dangerous to the public health, and has special reference to tuberculosis.

Chapter 499 provides that the requirements made by the chief or any inspector of the district police in regard to heating or plumbing, ventilating, or other matters are subject to appeal to the State Board of Health, whose decision shall be final. I cannot see from that act how the State Board of Police have any final authority as to any matter. I don't think that act was thoroughly understood by the State Board of Police when it went through. (Laughter).

Chapter 503 provides that egresses or means of escape from public buildings shall be provided with a sign visible thirty feet away, and also that factories and work shops shall be well lighted.

Chapter 537 establishes health inspection districts, and provides for the appointment of health inspectors, as has been described by the Chairman of the Board of Health.

Among the so-called "health measures" that failed to be enacted the following may be of interest:

1. To license chiropodists.
2. To license barbers.
3. Removal of old wall paper.

4. Adulteration of linseed oil.

5. Registration of osteopaths.

6. Regulating the practice of medicine, so as to more completely exclude Christian Science practice.

7. Licensing midwives.

8. To prevent the sale of opium or morphine without written prescription from a doctor.

9. Giving the State Board of Health co-ordinate power with the local board.

That in my judgment was a reasonable provision, but it stirred up so much feeling among the members of the General Court from a local standpoint that it was thought wise to abandon any attempt of that kind this year.

10. Vaccination exemption certificate to be signed by school physician.

That has already been alluded to.

11. Anti-cigarette laws.

There were several proposed bills on that subject, the most stringent of them being to absolutely prohibit the manufacture and sale of cigarettes in the Commonwealth.

12. Enlargement or establishment of cemeteries to be approved by the State Board of Health.

That was a measure in line with the one to give the State Board co-ordinate powers with the local boards. That stirred up a tremendous amount of local feeling, and it was felt wise to abandon efforts in that direction.

13. Prohibiting marriages of persons afflicted with certain diseases, such as syphilis, epilepsy, etc.

14. Contamination of the Merrimac and Connecticut Rivers.

15. Dredging the Neponset Valley.

16. Protection of food exhibits from flies, dust, etc.

17. The so-called drawn poultry bill.

18. To regulate the making and selling of ice cream.

19. To provide that when patent drugs or foods are ad-

vertised the advertisement shall make clear the amount of alcohol, opium or chloral hydrate present.

20. To prohibit Boards from allowing stables to be built within 200 feet of dwelling houses, schools or churches.

I think that last includes all of the petitions and bills that were brought before the Health Committee.

Curiously enough this year no attempt was made to secure the passage of an anti-vivisection law, or to repeal the present vaccination law. (Applause).

THE PRESIDENT: These subjects are now before the Association. I think I see in the audience here a gentleman who had a great deal to do with the procuring, or at least was very much interested in the legislation with regard to which I spoke to you. I think we should all be very glad to hear from Mr. Winslow.

PROF. WINSLOW. Mr. Chairman, I think there remains very little to be said about the measure for creating health districts after the President's summary of the question. That feature of the bill which transfers the inspection of factories from the State Police to the new district inspectors of the board is one in which I have been deeply interested. The members of this Association may remember, perhaps, that the question of the condition of factories and workshops in the State was brought before this body a little over three years ago, at the April meeting in 1904; then, for the first time, public attention was called to the need for reform and the campaign which has culminated this year was begun. At that time this Association adopted a resolution urging an investigation by the State Board of Health of the conditions of factories and workshops, and that resolution of this Association was brought up on the floor of the House and was instrumental in securing the first investigation by the State Board of Health of factory conditions. The first investigation

made clear the need for further study of the subject, and two years ago the Legislature directed the State Board to make a second, a more exhaustive one. The results of that second study, as reported last winter, was so striking as to furnish an overwhelming argument for some reform in the method of controlling factories and workshops. The laws on those subjects are of a wholly general character, leaving the interpretation and the application of the law in a particular case to the inspectors. The inspectors of the State Police not being trained men, medical men or sanitarians, proved wholly unable to interpret those laws so as to maintain sound sanitary conditions, and it was clearly for the advantage of all concerned, the workers and the employers and the public, that some change should be made.

As our President has said, this law creating sanitary districts forms the climax of the scheme of advisory health legislation which has been built up in this State, and it must be a wonderful thing for the President to look back on the whole plan, so largely the result of his own work, to feel that it is now complete. This measure, however, from another viewpoint, marks the beginning of a totally new field of work for the State Board of Health. At the same time these medical inspectors complete the advisory and scientific organization of the State, they mark the entrance of the State Board of Health into executive work, because the control of factories is necessarily an executive function. As society becomes more complex, we must have more executive work all along the line. We must tend to enlarge the powers of the State and to place those powers in the hands of the authority which can exercise them best. Since it has proved that a non-expert body is unable to exert a proper control over factory sanitation, it has seemed to the Legislature best to lay the responsibility upon the only body which can scientifically and efficiently fulfil it.

The success which the State Board has attained in its pre-

vious lines of work makes it certain that in the control of sanitary conditions in factories and workshops, which is a new field in America, Massachusetts, through its board, will take the same leadership that it has already taken in water supply and in sewage disposal and in all those functions which the board can exercise from a purely advisory standpoint.

It seems to me that all of us who are interested in sanitary matters in Massachusetts ought to feel proud of this new law and grateful to Dr. Wheatley for his share in procuring it. It is a great thing to have a fine body of inspectors, who will bring the conditions in the factories up to the standard where they should be. It can be done without damaging any one. It can be done, as has been shown again and again, without great expense, and with advantage to the employer as well as to the employee, and with the greatest advantage to the public. It is a cause for great congratulation, I think, that with the general system of medical inspection, which rounds out and completes the broader powers of the Board of Health, this vital connection with the industrial life of the community has also been established. (Applause).

THE PRESIDENT. We shall be very glad to hear from any one who takes an interest in this subject, or in fact from any one who has any question to ask with regard to these matters. Failing the man with the question, I think we should like to hear from Dr. Chapin. (Applause).

DR. CHAPIN: Mr. President, when there were only two colonies in New England, Massachusetts and Connecticut, it seemed desirable for certain reasons that another should be founded, and owing to the good efforts of Massachusetts people Rhode Island was founded. It was important then that we should have a number of points in this country where different experiments could be tried, and a very useful experiment was tried in Rhode Island. It has had a wonderful influence upon this country. But conditions have changed, and

I was thinking as I listened to what you told us to-day about this very excellent law, giving your board so much authority and enlarging your field of labor so much, and what the doctor told us about the other laws that had been passed, and perhaps what, as he said, is equally important, the laws which were not passed, I could not help feeling sorry that Rhode Island, having done its good work, could not now be united to the Commonwealth of Massachusetts. (Applause.)

THE PRESIDENT. Mr. Gove, your ancestors and mine in Salem had a good deal to do with driving Roger Williams out. Perhaps you can say something on this subject. I think you ought to after what Dr. Chapin has said.

MR. GOVE: Mr. President, I am afraid I shall have to disappoint you. In the first place, my ancestors, with one exception, do not appear to have come from Salem, where I reside most of the year, but from the edge of the next State, New Hampshire, where I am residing just at present in the summer. That is outside of the jurisdiction of this Commonwealth, and it is not affected by the laws which are passed here.

I was very much interested in hearing the clear, concise summary of the laws which have been passed during the past Legislature. I think some are likely to prove very useful. But from my own observation while a member of the Massachusetts Legislature and from my observation since, I can most heartily concur with what the doctor in the Senate says about the importance of not passing laws which had better remain unenacted. I am much interested in that phase, as well as in the other one, and I think great caution should be exercised in regard to the passage of laws. There is one thing to be remembered in regard to all laws, whether good or bad, and that is that the most important thing about them is to see that they are properly enforced. It only brings disrepute upon the law, and causes many evils, to have any law passed which is not well enforced. Worse than that is to

pass a law which ought not to be enforced. (Applause).

THE PRESIDENT: Is there any other business to come before the Association at this time? If not, it is moved that we now adjourn.

The motion prevailed and the Association adjourned.

COMMUNICATIONS.

(*Circular Letter from American Medical Association.*)

Chicago, June 20, 1907.

Dear Doctor:—At the Atlantic City Session of the American Medical Association the following resolutions, regarding the work of the Council on Pharmacy and Chemistry, were presented by the Reference Committee on Reports of Officers and were unanimously adopted by the House of Delegates.

Whereas, The Council on Pharmacy and Chemistry, after examining many hundreds of preparations, has officially announced its approval of a large number of such preparations; and

Whereas, We believe that the editors of many medical journals in this country, both official organs of State Associations and privately owned journals, are desirous of co-operating in the work of freeing the medical profession from the nostrum control; therefore, be it

Resolved, That this Association most earnestly requests all medical journals to refuse to aid in promoting the sale of preparations which have not been approved by the Council, by refusing advertising space to such preparations; and be it further

Resolved, That we most earnestly request the moral and financial support of our members for those medical journals,

whether privately owned or controlled by medical organizations, which disregard commercialism and stand firm for honest and right dealing, thus sustaining the Council in its great est work for the medical profession.

In accordance with the instructions of the House of Delegates, I am sending you a copy of these resolutions in the hope that the American Medical Association and its Council on Pharmacy and Chemistry may have your support and cooperation in this most important work. I am also sending you a list of the preparations that have thus far been approved by the Council, as well as some articles reprinted from The Journal, which will, I hope, be of interest to you.

Very truly yours,

GEORGE H. SIMMONS

General Secretary.

[The above resolutions meet with our hearty approval.—Ed.]

CHEMICAL LABORATORY NOTES.

Franklin C. Robinson

Professor of Chemistry, Bowdoin Collige, Brunswick Maine.

NEW DISINFECTANTS. When anhydrous oxalic acid is mixed with such well known substances as carbolic acid, cresols, naphthols, sulfonic acids, formaldehyde, etc., the resulting mixture is a solid which can be pressed into cakes or tablets, and these are convenient and cheap for disinfecting vessels in a sick room, where bichloride of mercury is generally used. Of course such mixtures are poisonous. The process has recently been patented in England and Germany.

FORMALDEHYDE IN SOAP. Various attempts have been made to prepare a disinfecting soap by incorporating

formaldehyde with the soap stock, but they have hitherto failed because the formaldehyde is soon oxidized and destroyed. But it is claimed now that if a small amount of normal sulfite of an alkali metal be present this oxidation is prevented. This claim is the subject of a recent United States patent.

COMPARISON OF PHENOL AND CRESOLS AS DISINFECTANTS.* Previous experiments by M. W. Blyth and others have shown that the cresols (the active disinfectants in creolin, lysol, cyllin, solutol, solveol) are stronger disinfectants and less poisonous to human beings than phenol (carbolic acid). Now Blyth and Goodban give an expression to this difference in what they call the "dilution figure." They find the dilution figure for the cresols to be 270 and for phenol 130, meaning by these that one part of pure cresols diluted with 270 parts of water will kill the test organisms in 12.5 minutes but not in 10 minutes, while phenol will only stand a dilution with 130 parts of water to be equally effective. They used B. coli as a test organism. They proved also that mixtures of phenol and cresols had dilution numbers corresponding to the amount of each present, thus showing that each had no influence on the other. The tests were made by adding 5 grams of the disinfectants to 25 c. c. of a solution containing 10 grains of pure potash soap and 10 grams of pure resin soap made up to 100 c.c. with water. The incubation was at 22 degrees C.

In a mixture the percentage of phenol and cresol can be found by use of the following formula, where, for example, P=per cent. of phenol; D_1=dilution figure for cresols; D_2=dilution figure for phenol; D_3=dilution figure for the mixture.

$$P = \frac{100\,(D_1 - D_3)}{D_1 - D_2}$$

*Analysis 1907. No. 32.

It should be remembered that the presence of organic matter interferes seriously with the disinfecting power of both phenol and cresols. 5 c.c. of milk added to the test solution made as above lowers the dilution figure of cresols to 170 and of phenol to 90.

NEW TEST FOR PROTEIDS.* The author finds that Hehner's test for formaldehyde in milk can be used as a general test for proteids, and hopes that it may prove of value also in distinguishing complex from simple proteids.

He applies the test as follows:—to a small amount of the suspected proteid is added about 2 drops of a 1-5000 solution of formaldehyde, then, after a minute or two, about .5 c.c. of concentrated commercial sulfuric acid is carefully added so that two layers of liquid are formed. In the presence of proteid of any kind the violet colored zone appears at the junction of the fluids.

A few non-proteids, as amido-guanidine nitrate, and murexid, give a similar color, but they give it also with the sulfuric acid and water alone.

FURTHER WORK ON FORMALDEHYDE AS A DISINFECTANT. † T. B. McClintoc has repeated the work previously done and in general confirmed it. He finds that the formalin-permanganate method of disinfecting rooms, which was first made practical by the work of the Maine Laboratory of Hygiene, is the best. The humidity of the room should be 60 and the temperature not below 65 degrees F. Two hours' exposure is then enough. For details consult the original bulletin or that of Maine State Board of Health for March, 1907.

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*Am. Chem. Jour. June 1907, S. F. Acree.

†Lab. Pub. Heal. Mar. Hos. Service, Bulletin 27.

PERSONAL HYGIENE.

By Percy G. Stiles, Ph. D.
Instructor in Physiology, Massachusetts Institute of Technology.

PROFESSOR FISHER'S EXPERIMENTS ON DIET AND ENDURANCE.* Another important paper has come from New Haven and added materially to the data in favor of restricted eating already gathered at Yale. Professor Fisher, the author, disclaims expert knowledge of physiology, but has presented his results nevertheless in clear and telling form. Under his supervision nine students adopted the practice of protracted mastication ("Fletcherism"). The usual results were obtained; that is to say, the appetite was satisfied with much less food and proteid was reduced even more notably than the total ration. At first the change was purely instructive and not aided by any suggestions as to the choice of food; later the men used tables showing percentage composition and gave the preference to low proteid foods when the appetite did not oppose.

Severe tests of muscular endurance were made at the outset, in the middle of the five months' term, and at the close. Meanwhile there was no physical training whatever. The men took less exercise than had been their habit. But the tests showed a very striking increase in the power to make repeated movements not involving the utmost exertion. In other words fatigue was not so readily induced on the low diet as at the time of the earlier trials when the metabolism was greater. The power to make maximal efforts was not increased.

Professor Fisher does not speculate at any length respecting the cause of this postponement of fatigue. It will be of

*Trans. of the Connecticut Academy of Arts and Sciences, XIII, p. I.

great interest to learn whether it is due to a lower proteid metabolism which means a system comparatively free from nitrogenous decomposition products, or whether it is specifically due to a lessened ingestion of meat with consequent reduction of the extractives at large in the body. In the second case we should be led to single out the nucleins and the extractives of animal food as to blame for premature fatigue and we might not have to bring all proteids under the ban.

We understand that further work is planned and that a new squad of volunteers has been secured. In the research reported observations began in winter and ended in summer. More or less unconscious reduction of the diet was to be expected with the advance of the season, but this by no means invalidates the results. Probably the forthcoming study, begun as it will be in warm weather and running into the winter, will parallel the first in all essentials. Professor Fisher admits the same backsliding among his subjects when released from discipline that Benedict noted with regard to Chittenden's men. He believes this to be owing to environment rather than instinct.

A NEW STUDY OF MIGRAINE. Dr. S. I. Franz, of the MacLean Asylum, has recorded a most careful study of the systemic conditions prevailing in a patient subject to severe and frequent headaches.* His own diligence in pursuit of his purpose and the painstaking and intelligent co-operation of the sufferer are equally to be commended. The research is a model investigation of a hygienic problem. But the results are largely negative. It would seem that there should be some simple and definite cause for an acute trouble like migraine and to find and remove it would be to bless a large fraction of humanity. But the condition is really most baffling and obscure. Dr. Franz finds no evidence from the urine of a perverted metabolism at the time of the attacks.

*Am. Journ. of Physiology, XIX, p. 14.

He cannot refer the pain entirely to increased blood-pressure for while there is usually such abnormal pressure it is as marked on the comfortable as on the aching side of the head. Neither does a reduction of pressure always give relief. After reading this article one will hesitate to attribute headaches to unhygienic conditions which the subject can remedy. No doubt indigestion, constipation and eye-strain aggravate the trouble, but the root seems to be in the vague realm of "constitutional" tendencies.

VETERINARY HYGIENE.

V. A. Moore B. S., M. D.
Professor of Comparative Pathology and Bacteriology New York State Veterinary College, Ithaca, N. Y.

A COMPARATIVE STUDY OF TUBERCLE BACILLI FROM VARIOUS SOURCES. Those who are interested in the investigations relative to the relation existing between tubercle bacilli, especially of man and of cattle, will find considerable data of interest in the recent bulletin of the Bureau of Animal Industry by Drs. Mohler and Washburn. The bulletin, after giving a brief historical summary, enters into the discussion of tubercle bacilli which they isolated from various sources. The results of their work as set forth in this bulletin can not be better or more justly presented than to quote their conclusions, which they believe to be justifiable from the results of the experiments performed in the laboratory of the Bureau and other laboratories.

Conclusions.

"1. While certain peculiarities of growth, morphology and pathogenesis are observed with a fair degree of constancy in bacilli of human origin, nevertheless these characteristics are not universal, and notable exceptions are observed which would confuse those who would attempt to establish their

origin by means of such characteristics.

"2. A similar degree of constancy in the morphological, biological and pathogenic characters of the bovine bacillus is generally noted, but a certain range of differences has been observed, which, though apparently more limited than for the human bacillus, is nevertheless suggestive of aberrant forms.

"3. Therefore the assertion, based solely on these facts, that a bacillus has a certain origin, can only be tentative, as bacilli from man have been found which conform in all respects to bacilli obtained from cattle.

"4. Tubercle bacilli of widely different virulence may be encountered in different cases of bovine as well as of human tuberculosis.

"5. There is a certain proportion of cases of human tuberculosis in which may be found tubercle bacilli which are pathogenic for cattle.

"6. Dependent upon the medium in which grown—whether in vitro or in vivo—tubercle bacilli will present special characteristics in accordance with their different environment, and these characteristics may lead to a supposition relative to their origin, although they are not always fixed or unchangeable.

"7. The numerous instances above recorded in which the inoculation of cattle with tubercle bacilli from human sources has resulted in the production of tuberculosis must prove decisively that tubercle bacilli of human origin have been pathogenic to the bovine, or, on the other hand, the bacilli must have been bovine in origin, and in spite of this fact were readily able to obtain a footing within the human tissues, in either case demonstrating the transmissibility of the differing types from one species of mammals to another.

"8. The more the subject is studied the more numerous are the instances noted in which the bacilli appear naturally in animals that are far removed from the species supposed to be their usual host, thus proving that they are not closely

limited in their choice of victims and that there is no character possessed by any of these types of tubercle bacilli in one host that may not be found in another host under favoring conditions.

"9. Upon examination of the results obtained from inoculating bacilli marked 'Boy V' in this experiment it will be at once noticed that it possesses a remarkable degree of virulence, in this respect surpassing many that we have obtained from bovine sources. Culturally, morphologically, and pathogenically this culture conforms closely to the bovine type. Could it be shown to have originated, previous to its attack upon the boy, from a bovine source, its fatal effects upon the child's system would offer incontestable proof of the susceptibility of the human organism to the inroads of the bovine tubercle bacillus. If, on the other hand, the bacilli for many generations past have successively grown upon human hosts only, we must at once admit that in this instance the type approaches so closely to the bovine form that all of the prominent characteristic differences between them have been removed, and we have before us a tubercle bacillus of human origin that has become so modified by peculiar environment that it is no longer a representative except in name.

"10. There are human types of bacilli that are similar in morphology and biology, but vary as to their virulence; and, conversely, there are bovine bacilli typical as to form and growth, but less pathogenic than those usually observed.

"11. If we exclude culture BB, which has already been included in Ravenel's description of bovine organisms obtained from human tissues, it will be observed that of four cultures obtained from children, one gave all the known reactions to the various test applied for placing it in the bovine class. It will also be noted that of nine cultures of bacilli obtained from sputa, one was entirely beyond the virulence possessed by the others, although not so pathogenic as some organisms coming from bovine animals, but nevertheless indicating the differ-

ence in degree of virulence among sputa bacilli. Of the eight germs obtained from cattle, hogs, and sheep, one was observed which had a modified virulence when compared with the high pathogenicity of the others tested, again illustrating the variability of virulence of bovine germs.

"12. The question of the transmissibility of tubercle bacilli of bovine origin to man will not be here further discussed from these experiments; but sufficient evidence, in our judgment, has been adduced to warrant the adoption and enforcement of sanitary measures against the use of the meat and the milk of tuberculosis animals, and to make it advisable to eliminate all tuberculous cattle from the herd or to sterilize all the milk therefrom. While the greatest amount of tuberculosis in man is undoubtedly caused by its spread from human to human, the frequency of its infection from animals should not be underestimated.

MUNICIPAL SANITATION.

CHARLES V. CHAPIN, M. D.
Superintendent of Health, Providence, R. I.

BACTERIA IN SEWER AIR. It has of late been believed that the chance of the transmission of the infectious diseases by sewer air is *nil.* A number of examinations have been made which have indicated that sewer air is comparatively free from germs, and attempts to isolate pathogenic bacteria from the air of sewers have given negative results. A recent work by Horrocks* indicates that pathogenic germs may be carried by sewer air. Major Horrocks, among other numerous experiments, inoculated the sewage of a large military hospital at Gibraltar with a culture of *B. prodigiosus.* The culture was

*Public Health, May 1907, page 495.

put into the water closets and the bacillus was recovered on plates suspended in the top of the soil pipe, in catch basins, and in manhole openings in the street many feet distant. The experiments were carefully conducted and control plates showed that the organism was not found in the air of Gibraltar. One should not, however, hastily jump to the conclusion that sewer air is commonly a vehicle of infection. There is practically no clinical evidence to show that typhoid fever and other infectious diseases are transmitted by sewer air, and, indeed, the evidence that diseases in general are often air borne is very slight. There is on the contrary evidence to show that minute infected droplets, or dust particles, may float in the air in considerable numbers without causing disease. Until this subject has been further studied it is to be hoped that health officers will not be in a hurry to resuscitate the sewer gas bogey.

RECURRENCE OF DIPHTHERIA AFTER DISINFECTION.† In Baltimore the isolation of diphtheria does not terminate until negative cultures are obtained from all members of the family, and the house has been disinfected. The disinfection is tested by exposing organisms in a room, and in 1905 the organisms were killed in 1508 out of 1792 disinfections. Nevertheless the disease recurred within two months in seventeen instances, or 1.77 per cent. of the 962 reported cases. In Providence in the two years, 1905 and 1906, in 516 families (not cases) where there was no disinfection, and isolation was terminated without cultures ten days after the disappearance of the membrane, there were 8 recurrences, or in 1.55 per cent. of the infected families.

TYPHOID FEVER AND DISINFECTION.‡ A recent report on typhoid fever in the District of Columbia refers to a careful investigation of the measures that were taken to disin-

†Report of the Health Department of Baltimore, 1905, page 107.

‡The Origin and Prevalence of Typhoid Fever in the District of Columbia Hygienic Laboratory, Bull. 35, Public Health and Marine Hospital Service.

fect the excreta of 492 cases of typhoid fever treated in their homes in the district of Columbia. It was stated that in only 145 cases was the disinfection efficient, it was of doubtful efficiency in 51 cases, and entirely ineffectual in 286. It is probable that home disinfection is equally inefficient in most American cities. Certainly this should not be so, and the report referred to justly blames the medical profession for its neglect in the failure to see that proper disinfection is carried out. Failure to properly care for the excreta results often in the extension of the disease in typhoid infected families. This report estimates that six per cent. of the cases in Washington were due to this cause. In Providence, during the last five years, about ten per cent. of the cases of typhoid fever have been due to "contact infection" in the family of the initial case. Proper care of the excreta is neither difficult nor expensive, and there is no good reason why it should not be insisted upon in every instance.

Contact infection with carrier cases is coming to be recognized as the most important factor in the extension of typhoid fever. A notable case in New York City where a well woman infected with typhoid bacilli gave rise to the disease in several families where she worked as a cook, has found its way into the daily papers.* Similar cases have been reported elsewhere, and a good resume of the literature on this subject may be found in the report from the Hygienic Laboratory above referred to.

*Journal of the American Medical Association, 1907, I p. 2019.

SANITARY ENGINEERING NOTES.

By Robert Spurr Weston.
Assoc. M. Am. Soc. C. E.

THE POLLUTION AND SELF-PURIFICATION OF NATURAL ICE.† The author describes many cases of disease attributed to the pollution of ice, and sums up the instances as follows: Out of some six epidemics assigned to ice infection, in only one was the number of cases reported greater than twelve. Four were merely intestinal disorders, not due to specific germs. Ice may be infected (1) from the harvesting of ice from polluted sources, (2) during harvesting or from the operations of harvesting, (3) from the surface drainage during thaws, (4) and from exposure in handling and delivery. However, natural agencies work to thwart these, especially subsidence and oxidation of suspended matters, including bacteria and the removal of these as well as dissolved matters during freezing. Again, low temperature affects the vitality and life of bacteria, and the time element is also of importance. Natural purification of ice as ordinarily handled exceeds that of the sand filter by some two hundred times. In spite of this, however, there is danger from certain sources mentioned above, particularly the last three, as well as from artificial ice made from polluted water and marketed without storage before natural purification agencies have time to operate. Hence, constant watch of ice supplies should be kept.

PROGRESS ON NEW YORK CITY'S CATSKILL WATER SUPPLY SYSTEM: DAMS OF THE ASHOKAN RESERVOIR. * This supply, to bring 500,000,000 gallons of water per diem to the city is to be taken from the Catskill Mountain region. The reservoir is to be twelve miles long with maximum width of two miles divided into two basins of

†Eng. News, 57, p. 454.
*Eng. News, 57, p. 518.

nearly equal sizes. The masonry (approximately 1,000,000 cubic yards), earth dams (6,000,000 cubic yards) across the Esopus and a series of earth dikes closing the valley of Beaver Kill, etc., will be nearly two miles in length, and will cost from ten to twelve millions of dollars. The upper dam is to be five thousand feet long with maximum height above the river gorge of about two hundred feet. There will be a central gate-house capable of handling 1,200,000,000 gallons daily, the first outlet for nearly eleven miles of aqueduct. This aqueduct will pass beneath the Hudson at Storm King.

EXPERIMENTAL SEWAGE TREATMENT WORKS FOR BALTIMORE, MD.†

MUNICIPAL SEWAGE EXPERIMENTAL STATION AT WATERBURY, CONN.

These two experimental sewage disposal plants have been erected in their respective cities for the demonstration of the methods of sewage disposal adapted to the respective sewages, and to elucidate some special points in connection with the methods thought practicable. Both stations are equipped with filters of different types, and chemical and bacteriological laboratories for observing the results of operation. The study of the efficiency of different forms of sprinklers for distributing sewage over trickling filters has been taken up with great care. These stations are examples of the scientific method which is coming to be employed more and more for the adaptation of standard system of sewage disposal to peculiar local conditions.

THE SANITARY ENGINEERING PROBLEMS OF WATER SUPPLY AND SEWAGE DISPOSAL IN NEW YORK CITY. ‡ This address, delivered at a meeting of the section of public health of the New York Academy of Science, states the opportunities for collection of new sanitary facts as

†Eng. News, 57, 35-36.
*William G. Taylor, Eng. News, 57, 238-242.
‡Geo. A. Soper, Sci. 25, 601.

well as the assimulation of data produced by scientists to mold public opinion toward a proper consideration of the topics which relate to public health. The author gives in brief the great problems of New York and the provision being made for its increased water supply demand, as well as investigations in regard to the future sewerage system. Those problems which have been solved have been done, he says, not by the unaided capacity of the head of the department, but with the help of qualified experts, and the future considerations of the sanitary engineering problems of New York must be done in the same way.

NOVEL SPRINKLER MOTOR FOR THE PERCOLATING SEWAGE FILTER AT WELLINGTON, ENGLAND.† This is a description of a sewage sprinkler of the revolving type, which is kept in constant motion by means of the power obtained from the flow of the effluent in the channel about the circular beds. Such a device has just been built for Wellington, Somerset, England, where six beds, each 50 feet in diameter, capable of dealing with 540,000 U. S. gallons in 24 hours, have been built at a cost of some $90,000.

TWO YEARS' OPERATION OF THE MUNICIPAL GARBAGE REDUCTION PLANT AT CLEVELAND, O.‡ Little data exists concerning the cost of garbage collection and disposal. Two years ago the city of Cleveland bought the garbage reduction works of a private company. The article gives the cost of garbage collection, reduction and disposal in a detailed manner, which cannot be further condensed or reviewed. In 1906, 34,891 tons of garbage were disposed of at a cost of $186 a ton, or at a net cost of $0.147 per capita per annum. The original plant bought by the city was on the Chamberlin system, but in 1905 five of the fourteen old digestors were replaced by five-ton steam-jacketed digestors. By the old process 2.63 per cent. of grease was extracted,

† Engineering News, 57, 485.

‡ Eng. News, 57, 487.

while by the new process 3.75 per cent. can be extracted. The actual yield of grease in 1906 was 3.06 per cent., valued at $72,916. Besides this $26,574 worth of dry tankage were extracted and sold, as well as $2,981 worth of pressed tankage. The article is based upon a report by Mr. Springborn, Superintendent, and is well worth careful reading.

COPPER SULPHATE USED AT PAWTUCKET, R. I., TO PREVENT THE CLOGGING OF SEWAGE BEDS BY MICRO-ORGANISMS.* Frequently the sewage beds at Pawtucket become clogged during summer. This clogging was caused by a blanket growth of Oscillaria and other organisms. It was necessary at times to scrape the beds to a depth of 6 or 8 inches and replace the sand removed in this way. Finally an application of copper sulphate was made to the beds and the distributing piping and manholes were scrubbed with a solution of copper sulphate. After this treatment growths of Oscillaria and other organisms ceased. The beds are now working as well as during former years when the growths did not occur. The nitrification of the beds was not injured in the least by the addition of copper sulphate.

THE SANITATION OF AIR.† This is an abstract of an article by Konrad Meier in Popular Science Monthly.

The author quotes recent experiments of Fluegge which showed that ill effects of air in crowded assembly rooms are due to the disturbance of thermo functions of the body by heat and moisture, rather than to the exhaustion of the air. While the effect of exhausted air may have been over-estimated, that of contaminated air does not seem to have been realized sufficiently. Foreign gases may react directly with blood, but these are unusual sources of contamination, are local, and may be done away with quite easily. This is not true in the case of floating particles.

*Engineering Record, 57. 379.

†Engineering Record, 55, 158-59.

Asher has shown that a smoky atmosphere encourages perspiratory diseases. The effect of dust as a carrier of disease germs is noted. The presence of bacteria in the respiratory tract is not the only cause of disease. Irritation by dust is a predisposition. This dusty condition explains the increasing prevalence of pneumonia in large cities—30 per cent. increase in New York for 1905, as compared with 1904. Concentration of population increases faster than the measures for the alleviation of the dust and smoke nuisance.

Because it is practicable to burn coal without smoke, no restriction should be placed upon the use of any coal, but no black smoke should be permitted within city limits. The dust of the streets, containing a large amount of animal refuse, is one of the chief sources of contamination. Dust of this character works into the New York Subway and settling upon the rough roadbed, cannot be removed. Stuffy air in buildings is often due to old dirt accumulated in corners and other dirty conditions, rather than to the character of the original air.

The author discourages the use of humidifiers in heated rooms, stating that the human system accommodates itself to the changes in humidity without discomfort within certain limits. Registers and radiators which gather dust are to be avoided. Very hot radiators volatilize organic matter deposited upon them. This process begins at 75 degrees C. and is rather assisted by moisture. Radiators should be simple and accessible. Heating surfaces should be ample and the temperature moderate. Artificial humidifiers are apt to become foul and malodorous. Devices for artificial cooling should not raise the humidity in summer or ill effects will follow. Artificial ventilating apparatus must be well designed and operated. Air filters should be cleansed in such a manner that the impurities removed will not again contaminate the air. Mechanical ventilating apparatus often fail to exercise sufficient control over draughts and temperature.

The depressing action of the effluvia of crowds of people

is because of its effect upon the nerves, rather than because of the presence of an abnormal amount of carbonic acid. Not only should the air be present in sufficient quantity, but the out of doors from which it comes should be kept clean. Cleaning, painting, repairing, street cleaning, etc., should not be neglected. The field of sanitary inspection should be extended to all public highways, byways, conveniences and conveyances.

Ventilation is not the only cure for vitiated air. To ventilate with smoky or dusty air is folly. Laws for the ventilation of public halls and conveniences need to be made. Natural ventilation should be employed if possible; otherwise use mechanical or forced ventilation. Moderate volumes of air well applied are better than large volumes applied indiscriminately or ununiformly. School parks, playgrounds, and a clean out of doors generally, are urged very strongly.

RESULTS GAINED BY THE COMPLETE REALIZATION OF THE PHYSIOLOGICAL CONDITIONS WHICH RESPIRATORY APPARATUS OUGHT TO SATISFY TO PERMIT THE EXISTENCE AND WORK OF MAN IN IRRESPIRABLE ATMOSPHERES WITHOUT DANGER.† For a respiratory apparatus to be practical it must not modify any of the physiological conditions of normal breathing. It must fulfill certain rules which the author has grouped as follows:

From the point of view (1) of respiratory mechanics, (2) of respiratory chemistry, (3) of man's safety, (4) of its durability. With these principles in mind, the author has constructed an apparatus which he does not describe, but he does describe interesting experiments with the apparatus. He tests the length of time it can be used, breathing being perfectly normal after five hours; its working capacity, a man with a

†M. J. Tissot, Compte Rondue, May 27, 1907, p. 1172.

weight on his head being able to walk up and down laboratory stairs over seven meters high, fifty times without stopping, ceasing then only because of fatigue to his limbs; its hermetic quality, the experimenter remaining in a room filled with illuminating gas for four hours without disastrous effect. It does not cause the number of respirations to rise above the normal (adult, man, 14 to 17 per minute; adult, woman, 15 to 18 per minute).

RESEARCHES ON THE ACTION OF SULPHUR WATERS IN THE MERCURIAL TREATMENT. A. Desmoulieres and A. Chatin. The authors give the results as well as a description of the experiments to ascertain to what one should attribute the well-known tolerance of the human organism in regions abounding in sulphur water to large doses of mercury than are usually possible to give, and how sulphur makes this remarkable absorption easy. The alkaline chlorides of the body play an important part in redissolving the albumens precipitated by mercurial salts, but the authors' experiments show that sulphur has a much more energetic action. Formerly it was believed that the therapeutic action was due to the formation of an inert salt and insoluble sulphide of mercury. The authors prove it rather to be due to an increased power of blood serum to dissolve albuminates of mercury.

SOME EXPERIMENTS WITH FLUORESCEIN AS AN AGENT FOR DETECTION OF POLLUTION OF WELLS.† The article is the result of experiments performed in Johannesburg, South Africa, to ascertain the cause of the presence of *B. Coli* in the water of one of the well supplies by the use of Fluorescein. It was found that water from a swamp was being admitted unfiltered to the well, and this led to the discovery of a fissure in the rock leading from the well. The report of the experiments is very complete, the conclusion being that Fluorescein does percolate through the

†M. McCrae and P. G. Stokes, J. Hyg. 7, 181-192.

soil, its rate varying according to the strata through which it flows; that it is harmless in the quantities used, and that evaporation of the samples of water renders the detection of this chemical more certain. Experiments are also described to disprove the theory that the method is of little use because it does not logically follow that bacteria can go where Fluorescein can. A harmless species of bacteria was introduced into the swamp and its presence was detected later in the well.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. Slack, M. D.,
Assistant Director Boston Board of Health Laboratory.

For the following notes we are indebted to the Medical News Columns of the Journal of the American Medical Association.

FREE DISTRIBUTION OF ANTITOXIN—ILLINOIS.† Under the omnibus appropriation bill the State Board of Health will be allowed $15,000 yearly for free distribution of antidiphtheretic serum outside of Chicago. The appropriations of the State Board of Health have been materially increased also by this bill, the sum of $119,200 having been appropriated for the work of the Board, against the sum of $83,320 granted by the General Assembly of 1905.

NEW SANITARY ACT—ILLINOIS.‡ A bill conferring additional powers on the State Board of Health has passed both houses and become a law without the Governor's signature. It gives the Board supreme authority in all matters of quarantine and makes it the duty of all local boards of health to enforce the rules and regulations adopted by the State Board. A severe penalty is provided for violation of the regulations of the State Board of Health, which is empowered

†A. M. A. Journal May 11, 1907.
‡A. M. A. Journal May 11, 1907 & May 25, 1907

to enforce health measures in cities and villages when the municipal authorities neglect or refuse to act with sufficient promptness or efficiency, and to collect from the city or village all necessary expenses incurred.

MEDICINE VENDORS BARRED—NEBRASKA.† Itinerant medicine vendors have been barred by the city council from obtaining licenses to sell their wares on the streets of Omaha.

TWO ANTICOCAIN BILLS PASSED—NEW YORK.† Without discussion or opposition, the Senate passed the bill making it a felony to sell cocain and eucain except on a physician's prescription; also the Whitney bill which also prohibits the sale of these drugs except on a physician's prescription, but provides a different system of prosecution and less severe penalties.

MAYOR APPROVES OF MILK STATIONS—NEW YORK CITY.† Mayor McClellan has signed the resolution adopted by the Board of Aldermen asking the Board of Estimate and Apportionment to issue special revenue bonds for $8,000, the proceeds to be used for the erection of milk stations in the parks.

CONSUMPTIVE CAMPS—PENNSYLVANIA.† The Senate approved the appropriation of $600,000 for sanatoria for indigent persons infected with incipient tuberculosis.

ANTI-VACCINATION BILL—PENNSYLVANIA.† A bill to permit the admission to schools of pupils whose physical condition makes vaccination dangerous to their health was passed finally by the Senate, May 7.

REGULATION OF MARRIAGE—PENNSYLVANIA.† The Senate passed the bill to prohibit marriage on the authority of licenses issued more than thirty days prior to such ceremony, providing that no marriage licenses shall be issued unless the parties shall first give certain information, and re-

†A. M. A. Journal May 18, 1907.

quiring this information to be certified to the department of health.

PURE FOOD LAW—TENNESSEE.† The Tennessee legislature has adopted the pure food bill introduced by Dr. W. B. Marr, and known as House Bill No. 141. The bill as adopted is an admirable one and can not but accomplish much good in the State.

DISTRIBUTION OF SAMPLE MEDICINES—NEW JERSEY.* An ordinance which became effective Feb. 22 provides "that no person shall distribute, deposit or leave on any street or private place, any medicine, medical preparation or preparation represented to cure ailments or diseases of the body or mind, or samples thereof, or any advertisement or circulars." The penalty attached is a fine of $50.

ANTI-SPITTING ORDINANCE—DELAWARE.‡ Dr. Harrison W. Howell, Wilmington, president of the State Board of Health, has drafted an anti-spitting ordinance for Wilmington to make it unlawful to spit on any sidewalk, or on the public floor of any hotel or lodging house, or on the floor, platform, steps or stairs of any public building, church, store, factory, street car, etc., and providing for a fine of from $5 to $20.

OPTOMETRY BILL VETOED—ILLINOIS.‡ Governor Deneen has vetoed the bill to regulate optometry. The Illinois State Medical Society, at its meeting in Rockford on May 23, extended a vote of thanks to Governor Deneen for his action. With the veto of this bill the medical profession of Illinois has succeeded in killing every objectionable bill introduced in the Forty-fifth General Assembly, including four "osteopathic," two "medicine peddler," two "optician," three "magnetic healer," and one "antivivisection" bill. Incidentally every measure strongly supported by the medical profession became a law.

†A. M. A. Journal May 18, 1907
*A. M. A. Journal May 25, 1907.
‡A. M. A. Journal June 1, 1907.

SCHOOL PHYSICIANS AUTHORIZED—NEW JERSEY.* The School Board of Atlantic City has authorized two school physicians at a salary of $400 per annum each, whose duty it will be to look after defective children and pupils who need medical attention.

PURE FOOD LAW—WASHINGTON.§ The pure food law recently enacted by the legislature is nearly identical in its essential features with the National Pure Food and Drug Act. The penalty for violating the law is, for the first offence, a fine ranging from $25 to $500, and for subsequent offences imprisonment.

WESTERN DISTRIBUTION FORBIDDEN—IOWA.† The city council of Iowa Falls, at a special session, May 26, passed an ordinance forbidding the custom of distributing from house to house or displaying in public places and in the streets, nostrums and literature referring to private diseases, or other subjects that may have a tendency to corrupt the minds of the young.

VACCINATION SUSTAINED — PENNSYLVANIA.† Governor Stuart vetoed the bill to amend the vaccination act, providing that certificates of successful vaccination or of having had smallpox shall not be required when smallpox is not known to exist in the said locality. He said that the words "known to exist" are indefinite. "In view of the fact that vaccination is a preventive measure, it would probably afford little protection to enforce the requirements relative to the said certificates only after smallpox is known to exist therein."

ANTI-VACCINATION BILL—CONNECTICUT. An adverse report by the Committee on Public Health and Safety on the bill to abolish the compulsory vaccination law, was approved by eight of the eleven members of the committee.

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*A. M. A. Journal June 1, 1907.

§A. M. A. Journal June 8, 1907.

†A. M. A. Journal June 22, 1907.

OSTEOPATH BILL KILLED—ILLINOIS.† House bill No. 318, to place an osteopath on the State Board of Health, failed of passage in the House, May 2. Another bill was designed to establish a standard for medical and osteopathic schools, to license osteopaths without examination and to confer on them "all the rights and privileges which physicians in the State now have." The State Board of Health was characterized as "an arrogant and arbitrary body having absolute power over the standards of medical schools." The bill met with the fate of the several osteopathic bills introduced in the Illinois General Assembly since 1897.

VIVISECTION BILL DROPPED—PENNSYLVANIA.† Representative Townsend's bill to prohibit vivisection has been dropped from the calendar in the legislature. This action followed an address in opposition to the measure made to fifty members of the House by Dr. S. Wier Mitchell of Philadelphia.

VENEREAL PROPHYLAXIS IN GERMAN TECHNICAL SCHOOLS—GERMANY.† By a recent ministerial decree the directors of the technical schools are instructed to make provision to have the medical inspectors of the schools give instruction in sexual hygiene at the beginning of the school year.

†A. M. A. Journal May 11, 1907.

BOOK REVIEWS.

Tuberculosis As a Disease of the Masses and How to Combat It: Fourth Issue Revised and Illustrated. Prize Essay by S. A. Knopf, M. D., New York, *Director in the National Association for the Study and Prevention of Tuberculosis.* (*Published by Fred. P. Flori,* 514 *E. 82d St., New York.*)

As stated in the preface, this essay was the result of a prize competition for the best popular essay on the subject of "Tuberculosis as a Disease of the Masses and How to Combat It," at the meeting of the International Congress for the Study of the Best Way to Combat Tuberculosis as a Disease of the Masses, which occurred at Berlin in 1899. The sum of 4,000 marks ($1,000) was contributed by two Berlin merchants for the purpose of this competition, which was to be held under the auspices of the Congress. A list of eminent German professors, physicians and sanitarians was selected by the Congres to conduct this competition, which was open to all countries. Out of eighty-one essays presented, this one of Dr. Knopf's was considered to "much surpass all the others in excellence," and, accordingly, the prize was awarded to him.

The essay was first published in the early part of 1901, and since that time it has been translated into twenty-two different languages, and the present issue is the fourth American edition.

No other popular presentation of the whole subject of tuberculosis within the knowledge of the writer has ever received such universal recognition or such extensive circulation throughout the civilized world as has been accorded this essay, and the cause is not far to seek, for besides the prestige of the prize essay selected after such severe competition and such rigorous examination by such eminent authorities, the subject itself is treated in such a comprehensive, lucid and practical manner that it appeals to everyone, whether layman

or physician. Every phase of the disease receives careful consideration, and one of the conspicuous merits of the work is the attention given to details. While the essay is perfectly intelligible to the layman, it affords the physician and sanitary officer a most reliable and complete working treatise upon the causes, prophylaxis and treatment of the disease. Indeed, every physician should have this essay ever at hand as his working manual if he desires to be successful in his treatment and to accomplish the most efficient work in prevention in the community in which he resides. Every aspect of the subject is accorded careful attention, although the emphasis is always laid upon the practical side. *What to do* is ever the question asked and answered.

A short historical summary of the varying opinions regarding the disease and its contagiousness opens the book, and then, after a few paragraphs showing the appalling prevalence of the disease, the facts concerning the channels of infection, predisposing influences, various forms of non-pulmonary tuberculosis, dangers from dried sputum and bacilli - containing saliva thrown out by coughing are vividly set forth, explicit directions are given for the safe and efficient destruction of the sputum, the use of cuspidors in all public places is urged and many illustrations of various forms of these utensils are given. Careful directions for disinfection are found, the common form by formaldehyde gas being advocated.

Considerable space is devoted to prevention, and under this head rules for the avoidance of the danger of infection through milk are given, although recent investigations have shown that this source of danger is not as great as was formerly supposed.

The chapter entitled "How May One Successfully Overcome a Hereditary Disposition to Consumption?" is particularly full and instructive. Excellent advice is given regarding the hygiene of dress, bathing, respiratory exercises with illustrations, the choice of occupation, the care of children of tuberculous

mothers, their raising and education, and (a point of much importance) methods of moistening the excessive dryness of artificially heated houses in winter. Every physician can, from his own experience, testify to the truth of the statement that "the excessively dry atmosphere in winter of many city and country houses often gives rise to nasal catarrh," and, one may add, to other respiratory affections.

Sanitary dwellings, the hygiene in factory and workshops, nutrition, alcoholism, unhealthy occupations, personal hygiene, all receive practical attention and explicit and simple advice is given upon each and every subject.

A short chapter is devoted to the main signs and symptoms of early tuberculosis, although the physical signs are quite properly omitted in a popular treatise on this subject.

The remainder of the essay is devoted to the consideration of the treatment and care of the disease. Statistics are given from various authorities and sanatoria showing the percentage of cures and of those who have remained cured, conclusively proving that consumption can be "lastingly cured."

The detail of the open-air treatment, both at home and in sanatoria, is very completely discussed and plain rules are given for carrying it out in simple and inexpensive ways. The statement of the author that success cannot be hoped for "unless the patient is obedient and willing to carry out every detail of the treatment," cannot too often be repeated. The disciplinary and educational value of sanatorium life also receives its due emphasis.

Statistics from the villages of Goerbersdorf and Falkenstein where five of the largest German sanatoria have been located for many years are given, showing that not only are well conducted sanatoria not a danger to the neighborhood, but since the establishment of sanatoria in these villages the death rate from tuberculosis in them has markedly decreased, undoubtedly due to the diffusion throughout these communities of the better knowledge of hygiene learned from the sanatoria.

Illustrations of methods of pursuing the out-door life, particularly at one's home, are given, and in the supplement the author illustrates and describes at length his "window tent" which can, at an inconsiderable expense, be applied to any bed chamber, and thus render possible practically out-door sleeping.

An important chapter is devoted to the solution of the tuberculosis problem in general and in the United States in particular. In order to efficiently accomplish this, the author, besides recommending the careful investigation of each case of tuberculosis, suggests five different institutions, as follows:

I. A centrally located reception hospital and dispensary.

II. One or several city sanatoria located in the outskirts.

III. One or several mountain sanatoria.

IV. Sea-side sanatoria for children afflicted with tuberculous diseases of the joints and other tuberculous (scrofulous) manifestations.

V. A maternity sanatorium.

This comprehensive plan may still seem ideal, but what, for example, has already been accomplished or provided for in the city of Boston and the State of Massachusetts indicates that this ideal plan is rapidly becoming a reality. Boston is soon to have its municipal dispensary and consumptive hospital for advanced cases. Massachusetts has its large sanatorium at Rutland and is soon to have three consumptive hospitals for advanced cases. It also has its sanitary inspectors throughout the State, an important part of whose duties it is to investigate all cases of tuberculosis in their respective districts.

All who have had much to do with tuberculosis, both in prevention and treatment, and are conversant with what has already been accomplished throughout the civilized world, can heartily concur in the author's concluding remarks: "That tuberculosis, especially in its pulmonary form, is not only a preventable disease, but one which in the majority of cases (if taken at an early stage) can be completely and lastingly

cured." "It is certainly within the power of man, living in a civilized country * * * * to combat tuberculosis as a disease of the masses most successfully." "All that is required to attain this goal is the combined action of a wise government, well trained physicians, and an intelligent people."

The author has further increased the indebtedness which we all owe him for this admirable essay by stipulating with its publisher that it should be sold for the price of 25 cents, so that it could be brought within the reach of the greatest possible number. EDWARD O. OTIS.

Foods and Their Adulterations—Origin, Manufacture and Composition of Food Products; Description of Common Adulterations, Food Standards and National Food Laws and Regulations.
By Harvey W. Wiley, M. D. Ph. D
P. Blakison's Son & Co. Phila., $4

To the chemist who expects to find within the covers a fund of new or improved methods or other valuable analytical data drawn from the store of the author's experience, this book will be a disappointment. It is, on the other hand, "descriptive in character, and aims to give within its scope as thoroughly and intelligibly as possible, an account of the various food products in common use in their natural and manufactured conditions with the usual adulterations which have been found therein."

The author has the faculty which few scientific writers possess of interesting the lay reader, while at the same time producing a book of value to the man of science. The dissemination of knowledge of this kind among the general public cannot but react for good, since it is only when public opinion

is aroused to the amount of adulteration and the injury to health and purse caused thereby that dishonest manufacturers will learn that it is more profitable in the long run to supply honest goods.

The intelligent cook as well as the physician and sanitarian will find much of value in this work. Food-faddists whose diet is varied to feed the brain or nerves according to the latest recommendations of the street car advertiser, may find much food for thought if they will take the pains to read this book.

Beginning with an introduction which takes up the social functions of food, the author proceeds to discuss proper and balanced rations and the classification of foods and also enters into a brief explanation of chemical terms used. The main portion of the book includes methods of preparation and manufacture, food values, simple tests for adulterations, effects of storage, etc., etc., while in the appendix may be found extracts from the national food laws, regulations for inspection, standards of purity, etc.

The typography, plates and cuts are good and the general make-up of the book excellent.

B. R. RICKARDS.

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THE AMERICAN JOURNAL OF PUBLIC HYGIENE

WITH this number the American Journal of Public Hygiene becomes the official organ of the American Public Health Association, Laboratory Section.

With the assumption of its new duties it has dropped its sub-title, becoming now the American Journal of Public Hygiene, a title expressive of the exact field it aims to cover.

By the new arrangement, all members of the American Public Health Association receive this Journal, while the present subscribers and members of the local association profit by the added valuable material with no increase in price.

We trust this is but one step toward the consummation of what seems to the editorial staff most desirable, — a closer relationship between the various local public health organizations and the national association.

B. R. RICKARDS, *Managing Editor.*

TIME LIMIT *VERSUS* CULTURE LIMIT IN DIPHTHERIA RELEASE

The arguments pro and con may be stated thus:

For a time limit of two weeks from the disappearance of clinical symptoms:

1. That patients' families, knowing that the period of isolation is definite and not onerous, are less likely to conceal cases than when a bacterial limit, with all its uncertainties as to length of time, must be looked forward to.

2. That two weeks' isolation after disappearance of clinical symptons meets the requirements in most cases.

3. That actual comparisons go to show fewer "return cases" when a time limit is used than when a bacterial limit is used.

4. That it is illogical to isolate convalescents because of the presence of diphtheria bacilli, when so many infected well persons (about one per cent of the whole population) go about undetected and unrestrained.

Per contra, it may be said:

1. It would be a difficult matter to decide how many cases are concealed for fear of the indefiniteness of the culture quarantine limit, as against those concealed for fear of any quarantine at all. Figures quoted below show that many cases are released by culture before the end of a two weeks' period. The number of persons who would elect to "gamble on" the chances of early release by the bacterial limit rather than settle down to a definite two weeks' wait would vary in different communities. In any case this argument applies only to families where concealment of a case would be tolerated, and the proportion of such concealments (deliberate, and not from ignorance, etc.) to the total number

of cases should be determined before the true weight of the argument would appear.

2. While it is true that two weeks' isolation after the disappearance of clinical symptoms is about the average period during which the bacilli remain, the actual periods, as shown by Rickards recently (Boston Board of Health Report, 1906), dated from the first positive culture for diagnosis to the last of two consecutive negatives, are: less than one week, 11 per cent; between one and two weeks, 38 per cent; between two and three weeks, 27 per cent; more than three weeks, 24 per cent. Now an average of one week may be allowed from the first positive culture to the disappearance of clinical symptoms, and hence to the beginning of a two weeks' time limit, which gives an average of confinement of three weeks in all under a time limit. It will be seen that 49 per cent of those thus confined for three weeks by a time limit would have been released within two weeks by a cultural limit; 27 per cent would receive about the same amount of isolation either way; 24 per cent would be released by a two weeks' time limit while still carrying the bacilli.

A time limit, whatever it be, must necessarily confine some persons too long, and free others too soon, the proportion of these two classes to each other depending on the period selected.

3. If it be true that "return cases" are slightly more numerous with a bacterial limit than with a time limit of two weeks,* no further argument on the merits of the two systems need be considered. But these figures are based partly on a comparison of results in Baltimore (bacterial limit) and Providence (time limit), and it is quite possible that the conditions were not parallel. It is true that a comparison of English results before and after the adoption of the bacterial limit also showed that the return cases were

* This JOURNAL, May, 1907, page 229, August, 1907, page 297, "Municipal Sanitation," Chapin.

more abundant with the latter. But in all, Baltimore, Providence and London, "return" infection by either method yielded cases less than two per cent of the number of those released. In other words, it would appear that the question of time limit *versus* bacterial limit is not one to be decided by evidence as to the very obvious and overwhelming effect of either on the spread of infection.

4. The fact that so many (one per cent of the population) well persons go about infected with diphtheria bacilli is not truly an argument against bacterial release from isolation, but against any form of isolation whatever. It is not the method of terminating confinement that is brought up by this argument, but rather the question of confinement itself.

Nor is this argument as strong as it appears at first sight. As generally stated it is somewhat as follows. Suppose that in a city of 600,000 inhabitants there are 100 convalescents from diphtheria. It is now well established that in such a city there will be at any one time about 6,000 infected well persons. Why confine the 100 infected convalescents, when nothing can be done about the 6,000 infected well persons? To reduce the total infectiveness of the city by 1-61 hardly seems worth while.

We think it can be shown that the restriction of 100 convalescents is much more than a restriction of but 1-61 of the total infectiveness. Let X be the average number of bacteria present in a convalescent's throat. If one person, going about freely for one day, with X virulent bacilli in the throat be taken as a unit of infectiveness, then 100 convalescents, carrying the bacilli for an average of two weeks, represent $100 \times X \times 14$ units of infectiveness $= 1{,}400$ X. But the 6,000 well persons carry per head a far smaller number of bacilli for a much shorter period; and only about 20 per cent of these are virulent. If we assume the bacilli to be one-third as abundant, and that no one individual of this class carries

them for more than three days, the 6,000 well persons represent 1-5 of $\frac{6,000}{1} \times 3 \times \frac{X}{3} = 1,200$ X units of infectiveness. In other words, the 100 convalescents do not represent 1-61 of the total infectiveness of the city, but 14-26, or rather more than half, and it is surely well to suppress one-half the infection, if this can properly be done, even if the other half is irrepressible. If, however, it be said that 6,000 persons are infected every day in the year (although not the same 6,000), and that, therefore, the time during which they are individually affected should be eliminated, the showing is somewhat different. In a city of 600,000, having an average of 2,400 cases a year, an average of 100 convalescents would exist on any one day. Hence the infectiveness of these for one year would be $100 \times X \times 365 = 36,500$ X.

The well persons would be $\frac{6,000}{5} \times \frac{X}{3} \times 365 = 36,500 \times 4$.

Even on this showing, the convalescents would represent 20 per cent of the total infectiveness — a very different amount from 1-61 or $1\frac{2}{3}$ per cent.

We incline, however, to the former method of calculating the true relative infectiveness of these two classes, for this reason, actual infectiveness is not alone a question of potential source; it must include also a numerical estimate of the opportunities offered by the potential receivers of infection. A well-developed case of smallpox on a desert island (or in a wholly vaccinated community) has immense potential infectiveness, but no actual infectiveness. On the other hand, the small potential infectiveness of a leprous case may have, through prolonged and intimate contact with many potential receivers, a great actual infectiveness. Hence one infected person coming in contact with the same set of potential receivers for two weeks has a much greater actual infectiveness than has a person of equal potential in-

fectiveness having contact with a new and different set of potential receivers every three days. In the case of a convalescent, the set of potential receivers is likely to be fairly constant for two weeks. In the cases of infected well persons, if the average period during which each carries the bacilli be, as assumed above, only three days, the set of potential receivers changes, on the average, every three days, *i.e.*, as the particular carrier changes.

But wherever the truth may lie as regards the handling of convalescents from diphtheria, the fact seems to be that whether handled by time limit or by culture limit, rather less than two per cent of new cases are accounted for by failures in either method. Since diphtheria morbidity is not on the decrease, although its fatality is, every case of diphtheria now existing must give rise on the average to one new case. The settling of the question as to convalescents, however interesting, will necessarily leave 98 per cent of the reproduction of diphtheria unaccounted for. It would seem much more important to search for the methods to control the, as yet, evidently uncontrolled source of this 98 per cent than to devote all attention to search for those errors in handling convalescents which result in the reproduction of at most two per cent. If we may tentatively accept the teaching that diphtheria is chiefly reproduced by early, unrecognized and concealed cases, the ultimate control of diphtheria to the point possibly of abolition becomes a matter of early diagnosis — which involves culture taking from *all* sore throats, with isolation until the report is received — *or* the prompt immunization of *all* sore-throat cases, together with the immunization of all potential receivers — *or* a judicious combination of both methods, "a word and a blow — the blow first," *i.e.*, give antitoxin first, and inquire about it (by means of a culture) afterwards.

H. W. HILL.

American Public Health Association

LABORATORY SECTION

CHAIRMAN'S ADDRESS

The Laboratory Section of the American Public Health Association

By H. W. HILL, M.D.
Minnesota Board of Health Laboratories
Minneapolis, Minn.

Gentlemen: The Laboratory Section was organized in 1899 for two reasons, both of which were significant of the times.

The first reason was the great development of laboratory work, and the importance which laboratory results had come to possess in public health circles. The rise and growth of the laboratory idea is too well known to all of you for extended reference here.

The second reason was, at first sight, a trivial one. The laboratory men who, before the formation of this section, presented papers to the Association found that they were too often addressing audiences who were not familiar with their vocabulary and saw little immediate significance in the minutiæ that they presented. On the other hand, the audiences complained that the laboratory men wearied them with minute details concerning matters with which most of them had no personal connection. In fact both sides showed some impatience—good-natured and courteous enough—concerning the other, and the obvious, simple and proper proceeding was to segregate those who wished to talk laboratory matters and those who wished to talk executive matters. This impatience was, after all, perfectly natural. It did but voice something which we hardly recognized ourselves, the coming of recognized specialism, of a profession within a profession, the expert of the test tube and microscope as a recognized and fully developed figure in the profession of

public hygiene in this country. The impatience was justified because we all had specialized, and no one specialist can listen patiently to another in minute matters of detail. The formation of a Section on Vital Statistics, now in progress, is a further example of recognition of specialism. As we represent the test tube and microscope, so they represent the specialized mathematics of a technical branch of public hygiene, so technical that most of us cannot follow their vocabulary, so far removed from our subjects that few of us could adequately define the subject if suddenly asked to do so.

It would be far from fair to say or think or allow it to be thought that the establishment of the Laboratory Section initiated specialism. It did but give recognition to it. Specialism was already in existence. We had laboratories and laboratory men, engineers and engineering departments, vital statisticians, epidemiologists, experts in infectious diseases, even in individual diseases, smallpox, yellow fever, etc., in port quarantine, etc., and the specialties of each were recognized. The results of the work of each were listened to eagerly by all classes of public hygienists, but the minute technique of these branches most specialists in other lines would not wish to follow, and generally could not follow if they wished. Of course, every specialist knows that the details of his specialty cannot be made interesting to an audience other than those of his own specialty; for one excellent reason, amongst others, because they have not a common vocabulary. Hence, without meeting places where he can discuss his own work with others in the same lines, the specialist is likely to restrict his public utterances to generalities, or to the application and results of his methods in practice, knowing that for these he can usually find an attentive audience. This state of things reacts upon the specialist, for if he cannot meet his own kind for full discussion, he gradually becomes isolated in thought from his fellows; his own methods and ideas become sacred to himself; he

dislikes other people's methods and ideas because they are not his; because merely reading of them, he does not see and understand them, and so he gets off into a world of his own. If every one did this, scientific thought would gradually disappear from amongst us *or* the ancient *régime* would be revived, where there was but one man in a century who contributed anything to scientific thought, the rest being mere followers of authority. To do away with all these drawbacks, the section idea was devised, and I for one wholly believe in its value in supplying a center for the specialist where methods and results can be compared and discussed, so that the evolution of the best as the composition of forces at many hands may be attained.

The danger of the section idea lies in the fact that the specialist may find so much satisfaction in discussing technicalities with other specialists that he forgets to make clear the use in the world to which his technicalities should be put. The application and results of scientific work in the world are the real excuse for their existence, at least in applied science, and the laboratory work in public hygiene is pre-eminently applied science. It is for these reasons that I believe we should carry clearly in mind the differences between the internal mechanism by which a certain result is obtained, and the application of that result in practice, so that the laboratory man who discusses in this section the most minute technicalities should not fail to make evident also the value in practice. If this value is evident chiefly in the laboratory, then it should be described here. But no real improvement in technique and no logical and exhaustive deduction from technical results can be made without a valuable bearing on executive problems. Sometimes the bearing of laboratory advance on executive work is indirect, tending to increased accuracy or rapidity, and hence is a matter chiefly for the laboratory man. But sometimes it has a wider significance, giving to the executive a new

method of solving an old problem, or even pointing out a possible solution for an achievement heretofore supposed to be unattainable. Such contributions should be made here as to technicalities, but before the Association as to application and results.

I am accused of tending to the clerical style in fondness for parables, but I will venture on one here nevertheless. The technician bears somewhat the relation to the executive that an expert watchmaker bears to the astronomer, the navigator, the railroad man. It is the technical watchmaker's business to know all about chronometers, mainsprings, escapements, and so on. To produce a perfect timepiece, accurate and reliable, is his life, his ambition, his primary reason for professional existence. But the most perfect timepiece, unless used for something, remains merely a work of art, a triumph of mind over matter, a proof of the patience, skill, persistence, mathematical and mechanical knowledge, manual training, etc., of the maker, but that is all. It is true that any wonderfully skillful aggregation of wheels, etc., which now has no use may have a use ten years hence, undreamed of now; but if watches were mere curiosities, which some day might be useful, but for which no use could be found now, few people could afford to work at the watchmaking business, and watches would never have arrived at their present perfection.

The reasons why watches are so perfect, why technical watchmakers of the highest skill exist, are found in the fact that timepieces are essentials to the work of the world.

But the technical watchmaker's interests may stop short with the perfect watch. He may not understand or care for its applications; he need not know anything about longitude to make a perfect chronometer, still less need he be an expert navigator.

If I have made myself clear, this watch parable parallels the whole situation. As the watch itself is a sum total of

brains, mathematics, mechanics and technical knowledge, beginning with the crude ores and ending with a perfect timepiece, so the laboratory and its finished products. But as the perfected timepiece when mechanically completed is only at the beginning of its career as a useful factor in the world's work, so the laboratory results must pass into practice and be applied to executive problems if they are to bear real fruit in the progress and welfare of humanity.

If you are not weary of these analogies, I can point out more. Navigation began long before the chronometer was brought to perfection. Great sea captains made great voyages successfully without them. It is true that they navigated by guess and by gosh, but they navigated and did it well under difficulties that would put the modern sea captain out of business. It is true that they did not do the finished, polished, rapid work of the *Lusitania* or the *Deutschland*, but they did it, and all honor to them. Navigation made the chronometer, not the chronometer navigation. But the chronometer made a science of what was at best an art, a matter of tradition, experience and hard straining physical and mental effort. It resulted in division of labor and specialism; the old sea captain did everything, the modern sea captain has a navigating expert who relieves him of that particular technical branch. Meantime other functions previously exercised by the sea captain of all ages have increased in complexity and importance, in the rapidity with which they must be executed, and the scale upon which they must be done. The modern captain of a great liner could not personally superintend every detail, as his ancient predecessor could, partly because there are more details, chiefly because each has become so much greater in mere bulk. The old sea captain might easily call the roll of a dozen men: how can the modern sea captain call a roll of 800 men? Subdivision of labor is essential to the great mechanisms of today. Principles do not change with mere increase in size, but modes of applications do.

In public hygiene, certainly in those bodies which conduct public hygiene on a large scale, similar subdivision must be carried out. Just how far it must go in each case is a question of local conditions, and depends chiefly on the extent and character of the work attempted. But whenever a definite department, with specialized experts, be they chemists, bacteriologists, engineers, vital statisticians, etc., is established, the executive, in losing a technical function, gains an executive function. The executive is to execute, to accomplish, to apply technicalities to the chief end for which public hygiene exists. The less the executive must personally do of the technical details of inspection, analysis or construction, the better he can attend to the executive function of accomplishment. What then is the final distinction between executive and technical branches of public hygiene, or indeed of any other branch of applied science? It seems to me that distinctions should be made and recognized, for public hygiene is going apace and we must be ready to fit into our proper places. The day of the public hygienist who is chemist, bacteriologist, engineer, vital statistician, lawyer, inspector of nuisances and clerk of his own office is rapidly passing, at least in the larger centers. How best divide the work is the problem of the moment; for although solved in some places, it has not been solved everywhere.

The primary difference between executive and technical is, it seems to me, this: the executive deals with men and their affairs, the technician with things and their affairs. The executive must be a fine technician in handling men; the technician must be a good executive in handling things. Every one knows of good technicians who have not executive ability enough to run a laboratory: every one knows of men of good executive power who have not the proper technique in handling men. The executive is he who makes the final application of the laws of nature to the solution of a problem concerning mankind: the technician is he who, as lawyer,

engineer or chemist, statistician or epidemiologist, analyzes the case, determines the facts and indicates, if he can, the procedure which promises the desired solution.

As in all government, the legislature makes the laws, the judiciary interprets them, determines their application, and points out their effect, while the executive, fully assured on these preliminaries, accomplishes with them the desired result; so in public hygiene, nature makes the laws, the technician interprets, and determines their applicability, the executive applies them to accomplishment. As we see sometimes lawyers so interested in a technicality that they forget that the main object of the law is to do justice, so we see laboratory men so interested in mere technique that its usefulness in the world is lost sight of. As we sometimes see a governor or a president impotent in the face of a national problem, from ignorance or neglect of laws already adequate to their solution, so we see at times executives in our lines who do not know or forget the means for solution of problems which the technician familiar with natural law can supply.

A governor need not be a lawyer in order to meet a national problem, but he should exhaust the resources of his experts in the technicalities of the law before abandoning his problem as unsolvable or waiting for new legislation. So the public health executive need not be a laboratory man, an engineer or a statistician in order to solve public health problems, but he should know the possibilities of each of these technicalities as working forces, and exhaust their possibilities before confessing himself beaten, or attempting to gain his end by roundabout or inadequate, incoordinate methods.

The good navigator need not be an expert watchmaker; but he should know to the last least item the possibilities of his chronometer in navigation. He has technicalities of navigation quite sufficient to occupy his attention, about which the watchmaker may know nothing.

I do not say that a watchmaker may not make better and more valuable chronometers if he understands the purposes to which they are to be put. I do not say that the navigator is a worse navigator because he can repair his chronometer on occasion. I do say that neither need know the whole intricacies of the other's work; and in practice both watchmaking and navigation are now so elaborate and detailed that only one man here and there can be expert enough in both to handle each on the highest expert plane, *i.e.*, to secure from his work the maximum of required result from the minimum of necessary expenditure. The ideal combination is an executive who knows what he wants to do, and the lines of attack to follow; and a technical staff expert enough to follow these lines to completion, placing each finished product in the hands of the executive for use.

If I may sum up, it is my firm belief that all analogy, the experience of the ages, the spirit of co-ordination and specialism of today, go to show that the executive and technical branches of every great machine should be, and by the necessities of the case are, co-ordinate branches of one whole; and that the specialism and subdivision of labor necessitated by the universal and increasing demands of modern life make it necessary as well as obviously advisable to recognize this fact in public health circles. I believe that our section, as the first technical section of this Association, has, in emphasizing this point, done better service to public hygiene in this than any other way, notwithstanding its accomplishments of no mean order in other directions.

This humble effort of mine addressed to you today has been difficult to prepare and difficult to deliver, especially before an audience personally interested in lines which I have touched on. It will be an utter failure if it fails of its single object, to contribute to a better understanding of the relations of the technical and executive branches to the ultimate advancement of public hygiene as a whole.

Preliminary Statement by the Committee on Standard Methods of Bacterial Milk Analysis

To the Laboratory Section of the

AMERICAN PUBLIC HEALTH ASSOCIATION

ABSTRACT

At the meeting of the Laboratory Section of the American Public Health Association in Boston in 1905, at the suggestion of Prof. S. C. Prescott of the Massachusetts Institute of Technology, a Committee (of which Prof. Prescott was made chairman) was appointed to study the various methods used for the bacteriological examination of milk and to recommend a uniform procedure.

A circular letter asking for information as to existing methods and technique used in bacteriological milk examinations was sent to leading bacteriologists of the United States. Many of these it proved did not make such examinations, and the replies of those who did showed wide variations of procedure on most important points, such as plating, composition of media, incubation temperature, length of incubation, etc.

At the Mexico City meeting in 1906, Prof. H. L. Russell, of the University of Wisconsin, was appointed Chairman of the Committee, but in June, 1907, he asked to be relieved of the Chairmanship, and, by the vote of the Council of the Laboratory Section, Dr. F. H. Slack, Assistant Director

of the Boston Board of Health Laboratory, was appointed Chairman in his stead.

In view of the importance of all bacteriological milk work and the fact that much work yet remains to be done on many important points, this report is offered only as a preliminary statement, and it is hoped that much more will be done along these lines in the near future. On many points the Committee has been unable to accumulate sufficient data to formulate conclusions, and these subjects are left open for further consideration. It is requested that those who differ from the Committee on any points of technique here presented will offer data in support of their views to the Committee.

After much experimental work and careful comparison of the methods in use in various laboratories, the methods given in this report are recommended by the Committee for the present for general use in the bacteriological examination of milk.

F. H. Slack, *Chairman.*
W. H. Park.
E. C. Levy.
F. C. Harrison.
C. E. Marshall.
H. L. Russell.

Acknowledgments

The attempt has been made as far as possible to follow along the lines of the admirable work done by the A.P.H.A. Committee on Water Analysis.[1]

Information has been difficult to obtain because so few are working along these lines. Much of the matter obtained has been of a contradictory character. Some who insisted on certain points of technique have failed to respond to the request of the Committee when pressed for data supporting their views.

An earnest endeavor has been made in sifting the material obtained to keep the best methods. To all who have answered our inquiries, whether or not their suggestions have been adopted, to those who have done experimental work and to those who have by their advice and experience aided in the preparation of this report the Committee wishes to express its appreciation and thanks. A list of these is appended.

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S. S. Buckley, College Park, Md.
W. M. Campbell, Boston, Mass.
F. R. Eilinger, Rochester, N.Y.
L. W. Fetzer, College Park, Md.
R. G. Frecman, New York, N.Y.
H. A. Harding, Geneva, N.Y.
E. G. Hastings, Madison, Wis.
P. G. Heinemann, Chicago, Ill.
H. W. Hill, Minneapolis, Minn.
H. Moak, Brooklyn, N.Y.
A. P. Norris, Cambridge, Mass.
C. E. North, New York, N.Y.
S. C. Prescott, Boston, Mass.
B. R. Rickards, Boston, Mass.
L. A. Rogers, Washington, D.C.
M. J. Rosenau, Washington, D.C.
W. G. Savage, Colchester, Eng.
W. O. Scott, Providence, R.I.
T. Smith, Boston, Mass.
L. P. Sprague, Burlington, Vt.
W. A. Stocking, Ithaca, N.Y.
W. R. Stokes, Baltimore, Md.
B. H. Stone, Burlington, Vt.
A. R. Ward, Berkeley, Cal.
F. F. Wesbrook, Minneapolis, Minn.
C. E. A. Winslow, Boston, Mass.

NUMERICAL DETERMINATION OF BACTERIA.

There is no method known by which the exact number of bacteria in a sample of milk may be determined, and even when the best methods are used, the count is always less than the actual number of bacteria present, for the following reasons:

(*a*) Many bacteria in process of multiplication are held together by adhesive membranes in pairs, chains or masses. It is for the purpose of separating bacteria thus joined, as well as to obtain an even mixture, that the sample itself and the diluted sample when plating are shaken. This shaking, while it breaks up larger masses and shortens long chains, does not to any great extent break apart the shorter chains, diplococci, etc. Each of these groups of bacteria, when caught in the solid medium, develops as a single colony.

(*b*) It is impossible to obtain a medium suited to the food requirements of all species or races of bacteria.[2]

It has been found by experiment that a medium consisting chiefly of a watery extract of raw meat, alkaline to litmus and slightly acid to phenolphthalein, will furnish the best food for the greatest number.[3]

(*c*) These varying forms of minute vegetable life require varying temperatures for their best development. Many forms which will develop at room temperature will not grow at body temperature. Some require a very high temperature for their best growth.

(*d*) Some bacteria develop in an atmosphere free from oxygen, some only where oxygen is present; many are facultative growing under either condition. Bacteria which require an oxygen-free atmosphere do not develop in plates as generally prepared. Bacteria requiring oxygen, if deep in the medium, develop but slowly, as they obtain oxygen only by diffusion.

(*e*) Many forms are slow in developing into visible colonies, some requiring three or four days. On the other hand, in plates grown for several days many small colonies are obscured in the growth of larger ones.[4]

(*f*) Each bacterium requires a certain amount of nourishment for development.[5] There are also antagonistic forms which will not develop in close proximity to each other. It therefore follows that in a crowded plate, *i.e.*, over two hundred colonies, many will not develop.[6] This is easily proven by making a higher dilution.

(*g*) Spreaders and molds, by their rapid surface growth, merge with other surface colonies and obscure deeper ones.

(*h*) Samples kept in the collecting case at 34° F. for varying periods have shown a tendency to decrease in the number of bacteria which will develop into colonies.[7] Samples kept in dilution water for several hours have shown a marked de-

crease in the number of bacteria which will develop into colonies.[8]

On account of these reasons strict adherence to standard procedure is of especial importance, since there are so many points where disageement may result if uniform technique is not followed.

Since at best only approximate results can be reached in the numerical determination of bacteria in milk, and since from the varying methods in use at present counts from different workers are usually incomparable, those methods which have given best results as a whole should be united upon and adopted by all, that a bacterial count on a sample of milk may mean the same if made in any standard laboratory.

COLLECTION OF SAMPLES.

QUANTITY OF MILK REQUIRED FOR ANALYSIS. The minimum quantity of milk necessary for making an ordinary bacteriological examination is ten cubic centimeters. When making examinations for certified milk, if possible a pint or quart bottle should be taken and brought to the laboratory unopened.

COLLECTING APPARATUS. In collecting milk samples for bacteriological examination it is essential that the sample be taken and kept in such a manner as to prevent either any addition of bacteria from without or multiplication of the bacteria originally present.[9] Bottles, tubes, pipettes, etc., used in the collection of samples, besides being washed, shall be sterilized with dry heat for an hour at or about 160° C., or to the charring point of cotton.

In the selection of "certified milk" samples it is recommended wherever possible that an unopened bottle be taken, placed in a suitably iced case and brought at once to the laboratory.

Samples of "market milk" may be collected as are water samples, in sterile, wide-mouthed, glass-stoppered four-ounce bottles; the case in which they are carried being well iced.[10] The principal difficulty encountered in this method is in transferring the sample from the original container to the bottle, and the various string and wire devices by means of which the bottle is immersed in the original container are objectionable both on account of the labor of preparing such an outfit and also on account of the coating of milk left on the outside of the bottle when the sample has been taken.

An apparatus designed for the use of thirty-two test tubes as containers[11] is recommended as superior to one designed for bottles.

It has been proven that with samples kept properly iced in this particular form of case there is no increase of bacterial content even for twenty-four hours, but rather a slight decrease,[7] the counts varying hardly more than might be expected in duplicate plates. It is recommended, however, that examination of the samples be proceeded with as quickly as possible after the collections are made.

IDENTIFICATION OF SAMPLES. When bottles are used identification numbers should be etched on both bottle and stopper. Test tubes should be labeled or etched[12] and numbered.

A complete record of the samples taken, giving date, time, place, name of party from which sample is taken, name of collector, temperature of milk, character of original container (tank, can, bottle), etc., should be written opposite duplicate numbers in a blank book or pocket card catalogue, or this information may be written on small tags and tied or wired to the corresponding test tube or bottle.

TEMPERATURE. The temperature should be taken immediately *after* taking the sample for analysis, while the milk is still thoroughly mixed.

If it is desired to take the temperature of "certified milk," this should be done when the sample is taken, but from another bottle.

A floating thermometer, graduated to the Fahrenheit scale, is most convenient, and the temperature should be expressed to the nearest degree. It is necessary to standardize the thermometer for at least ten degrees on each side of the legal temperature limit. A quickly registering thermometer should be left at least one minute in the milk and read as soon as removed. A small piece of clean absorbent cotton may be used to wipe the adhering milk from the thermometer that the scale may be easily seen.

REPRESENTATIVE SAMPLES. The collector should always select his own sample, and care should be taken to secure a sample which is truly representative of the milk to be examined.

One of several methods of mixing the milk may be used, comparison having shown the results to be practically the same.[9]

1. Pouring the milk into a sterile receptacle and back.

2. Shaking the milk thoroughly with receptacle turned upside down. (This may be done where the can or bottle is tightly stoppered or capped and is not so full as to prevent thorough agitation.)

3. In open tanks in stores it is allowable to stir thoroughly with the long-handled dipper generally found in use.

4. Where the test tube collecting case is used, thoroughly reliable results are secured by first shaking the can or bottle; and, second, stirring with the large pipette before taking the sample, care being taken to close the upper end of the pipette with the finger so that no milk enters until after the mixing, or the pipette may be emptied after stirring before the sample is taken.

5. For certified milk samples it is recommended that, on arrival at the laboratory, the bottle be opened with aseptic

precautions and the milk thoroughly mixed by pouring back and forth between the original bottle and a sterile bottle. Another method is to mix as thoroughly as possible by agitation for five minutes, then burn through the pasteboard stopper with a hot iron and remove the desired amount of milk with a sterile pipette.[13]

THE INTERVAL BETWEEN COLLECTION AND ANALYSIS.

Generally speaking the shorter the time between the collection and examination of milk samples the more accurate will be the results. For routine work the attempt should be made to plate within four hours of the time of collection.

Too much stress cannot be laid on keeping the samples properly iced during this interval. They should be kept below 40° F., but care should be taken that they are not frozen.

DILUTIONS.

Ordinary potable water, sterilized, may be used for dilutions. Occasionally spore forms are found in such water which resist ordinary autoclave sterilization; in such cases distilled water may be used or the autoclave pressure increased. With dilution water in eight-ounce bottles calibrated for ninety-nine cubic centimeters and in test tubes calibrated for nine cubic centimeters all the necessary dilutions can be made.

Short, wide-mouthed "Blakes" or wide-mouthed French square bottles are more easily handled and more economical of space than other forms of bottles or flasks.[11]

Eight-ounce bottles are the best, as the required amount of dilution water only about half fills them, leaving room for shaking. Long-fiber, non-absorbent cotton should be used for plugs. It is well to use care in selecting cotton for this

purpose to avoid short-fiber or "dusty" cotton, which gives a cloud of lint-like particles on shaking. Bottles and tubes should be filled a little over the 99 c. c. and 9 c. c. marks to allow for loss during sterilization.[14]

The dilutions recommended are 1-10, 1-100, 1-1,000, 1-10,000, 1-100,000 and 1-1,000,000.

For certified milk the 1-10 and 1-100 dilutions should be used, while the 1-10,000 will usually be found best for market milk.

The 1-10 dilution is prepared by shaking the milk sample twenty-five times and then transferring 1 c.c. of the milk to a test tube containing 9 c.c. of sterile water.

The 1-100 dilution is prepared in the same way, except that a bottle with 99 c.c. of sterile water is substituted for the test tube.

The 1-1,000 dilution is prepared by first making the 1-100 dilution, shaking twenty-five times and transferring 1 c.c. of the dilution to a test tube containing 9 c.c. of sterile water.

The 1-10,000, 1-100,000 and 1-1,000,000 dilutions are made in the same manner by dilutions of the 1-100, 1-1,000 and 1-10,000 dilutions, 1 c.c. to 99 c.c. of sterile water.

It is recommended that that dilution be used which will produce about two hundred colonies to a plate, ranging from 40 to 400; where a 1-10 dilution exceeds this number the 1-100 dilution is more accurate, etc. The number of bacteria present may if desired be approximately estimated before dilutions are made by direct microscopic examination of a properly prepared sediment. Otherwise it is necessary to make a range of dilutions, thereafter selecting for record the count obtained on that plate which yields between 40 and 400 colonies.

Plating whole milk is unreliable,[15] whatever quantities be used, since the bacteria are not so well separated as in the dilutions, and often, owing to the crowded conditions, only a portion of the bacteria present will develop into visible

colonies.[6] Moreover, if a cubic centimeter of the milk is used, the turbidity of the jelly, due to the presence of the milk, hides the colonies present from the eye.

MEDIA.

The standard medium for determining the number of bacteria in milk shall for the present be agar, made according to the recommendations of the Committee on Water Analysis,[1] except that the percentage of agar shall be 1 per cent and the reaction +1.5.[2d]

All variations from agar media made as described shall be considered as special media.

Much work yet remains to be done on media; the above is recommended as giving the highest and most uniform counts so far as our comparative work has extended and with but slight variations is the medium in most common use.

STORAGE OF MEDIA. Media may be made up in quantity, tubed and stored (preferably in an ice chamber).

PLATING.

PLATING APPARATUS.[11] For plating it is best to have a single water bath in which to melt the media and a water-jacketed water bath for keeping it at the proper temperature; a wire rack, which should fit both of the water baths, for holding the media tubes; a thermometer for recording the temperature of the water in the water-jacketed bath; sterile 1 c.c. pipettes; sterile petri dishes; and sterile dilution water in measured quantities.

For milk work porous earthenware petri dish covers[16] are much superior to glass covers, since they absorb the excess moisture from the agar and prevent "spreading."

It is quite essential to the best results that the porous covers should be wet as seldom as possible. In sterilizing

them the process should be prolonged over the time necessary to kill the organisms in order that the covers may be thoroughly dry.

Straight-sided 1 c.c. pipettes are more easily handled than those with bulbs; they may be made from ordinary glass tubing about $\frac{3}{16}$ of an inch in diameter and calibrated in the laboratory.[17] They should be made about 10 inches in length.

PLATING TECHNIQUE. The agar after melting should be kept in the water-jacketed water bath between 40° C. and 45° C. for at least fifteen minutes before using, to make sure that the agar itself has reached the temperature of the surrounding water. If used too warm the heat may destroy some of the bacteria or retard their growth.

For routine work in cities in order to bring down the actual number of colonies in a plate around the standard of two hundred, it is well to use a dilution of 1-10,000. To make this dilution use two bottles of sterile water each containing 99 c.c.

Shake the milk sample twenty-five times, then with a sterile pipette remove 1 c.c., put into the first dilution water and rinse the pipette by drawing dilution water to the mark and expelling; this gives a dilution of 1 to 100.

Shake the first dilution twenty-five times, then with a fresh sterile pipette remove 1 c.c., put into the second dilution water, rinsing the pipette to the mark as before; this gives a dilution of 1 to 10,000. Shake the second dilution twenty-five times, then with a sterile pipette remove 1 c.c., and put it into the petri dish, using care to raise the cover only so far as necessary to insert the end of the pipette.

Taking a tube of agar from the water bath, wipe the water from outside the tube with a piece of cloth, remove the plug, pass the mouth of the tube through the flame, and pour the agar into the plate, using the same care as before to avoid exposure of the plate contents to the air.

Carefully and thoroughly mix the agar and diluted milk in the petri dish by a rotary motion, avoiding the formation of air bubbles or slopping the agar, and after allowing the agar to harden for at least fifteen minutes at room temperature place the dish bottom down in the incubator. The practice of mixing the diluted milk with the agar *in the tube*, leaving a certain portion of the bacteria unplated, is not recommended by the Committee.

CONTROLS. Plating should always be checked by controls. A blank plate should be made with each set of milk plates for control of the water, petri dishes, pipettes, etc.

For control on technique of plating it is recommended that for work on "market milk," duplicates be made each day on several plates.

"Certified milk" should always be plated in duplicate, and where possible it is well to have one man's work occasionally checked by another.

Unless duplicate plates show as a rule approximately the same count, the worker should see if there is error in his technique.

Racks are very useful for stacking the plates and to prevent breakage.

Plating should be done always in a place free from dust or currents of air.

In order that the colonies may have sufficient food for proper development, 10 c.c. of agar shall be used for each plate. In plating a large number of samples at one time the dilution and transfer of diluted milk to the plates may be done for four or eight samples, then the agar poured, one tube to each plate, then another eight samples diluted, etc.

INCUBATION.

Concerning incubation two methods are at present in use. Three-fifths of the laboratory workers consulted recom-

mended incubation at 37° C. for twenty-four hours with saturated atmosphere, the remaining two-fifths allowed varying lengths of time at different degrees of room temperature and at whatever degree of humidity happened to obtain.

When considering these two methods many advantages of the method of incubation at 37° C. are evident, including the ease of maintaining this temperature in any laboratory, the evident uniformity of counts so obtained in different places as compared with those obtained by the varying methods of technique, as to temperature and incubation period, where room temperature is employed, and the quickness with which results are obtained, doing away with large accumulations of uncounted plates.

Forty-eight hour plates grown at 37° C. give a slightly higher count,[11] not enough higher to materially change the report, while the loss by "spreaders" is increased and the count delayed.

To secure saturation of the atmosphere the incubator should be made with a shallow depression over the whole bottom surface, which may be kept filled with water, or in default of this a large shallow pan of water may be kept on one of the lower shelves.

Much work will be done on comparison of 37° C. and "room temperature" during the coming year.

COUNTING.

EXPRESSION OF RESULTS. Since minor differences in milk counts are within the working error of the methods and are of no significance in practice, the following scale has been adopted for recording results of market milk examinations:

Counts below 100,000 are distinguished by ten thousands.

Counts between 100,000 and 500,000 are distinguished by fifty thousands.

Counts between 500,000 and 1,000,000 are distinguished by hundred thousands.

Counts between 1,000,000 and 2,000,000 are distinguished by two hundred thousands.

Counts between 2,000,000 and 5,000,000 are distinguished by five hundred thousands.

Counts above 5,000,000 are distinguished by millions.

Therefore only the following figures are used in reporting:

Below	10,000	Above	250,000	Above	1,400,000
Above	10,000	"	300,000	"	1,600,000
"	20,000	"	350,000	"	1,800,000
"	30,000	"	400,000	"	2,000,000
"	40,000	"	450,000	"	2,500,000
"	50,000	"	500,000	"	3,000,000
"	60,000	"	600,000	"	3,500,000
"	70,000	"	700,000	"	4,000,000
"	80,000	"	800,000	"	4,500,000
"	90,000	"	900,000	"	5,000,000
"	100,000	"	1,000,000	"	6,000,000
"	150,000	"	1,200,000	etc., by millions.	
"	200,000				

Counts on "certified" or "inspected" milk shall be expressed as closely as the dilution factor will allow.

The whole number of colonies on the plate shall be counted, the practice of counting a fractional part being resorted to only in case of necessity, such as partial spreading.

Various counting devices have been recommended by different workers. The more simple ones, where the whole plate can be seen at once, are more desirable on account of there being less likelihood of recounting colonies. Colonies too small to be seen with the naked eye or with slight magnification shall not be considered in the count.

EXAMINATION OF CELLULAR CONTENT OF MILK.

Examination of milk sediment reveals certain cellular constituents which when present in abnormal quantities are often regarded as indicating a pathological condition in the animal producing the milk. Microscopical examination of these elements shows a majority of them to be polymorphonuclear cells, and these are generally considered as indicative of suppurative changes.[18]

There seems to be absolutely no relation between the number of these leucocytes in the milk and the general leucocyte content of the blood, thus indicating that a large number of leucocytes in the milk points to a local condition only.[19]

Cattle not infrequently suffer from udder troubles,—gargets of various types in which inflammatory processes of varying degrees of severity may occur. In some cases these may be so slight as apparently not to affect the nature of the milk. Often, however, the milk becomes viscous, sometimes clotty or stringy, and may even be of a bloody nature.

Occasionally such troubles as these develop into a stage in which pus is actually present in such quantities as to be easily recognizable. Milks of this character should of course be excluded from food supplies.

In these cases where a physical examination reveals an abnormal condition, a microscopical study naturally presents a far different picture from that which one obtains in apparently normal milk, and the increase in the number of leucocytes is especially noticeable.

In contrast to these cases where the physical examination and the microscopic findings are in harmony, there are many instances where, although there are an abnormal number of leucocytes present, no physical changes can be demonstrated.

Boards of health have adopted arbitrary standards in a number of instances and rejected supplies with abnormal leucocyte content on the ground that the milk was unwholesome.

Where the numerical standard set is a high one this proceeding must be commended, since there are not lacking unscrupulous people who will put on the market milk from "gargety" cows which cannot be detected by the ordinary chemical tests. The numerical leucocyte test has been the means of detecting such milk, and tracing it back to cows with manifest physical lesions in many instances.[20]

Since, however, evidence already collected warrants, beyond all question, the general statement that these cells frequently do not have the significance that has been attached to them by many observers, it would perhaps be more fair to all parties concerned to use this test at present as a means of detection only, and not condemn the supply unless physical lesions are demonstrated.

We are not prepared at this time to recommend a numerical standard to serve as a basis for such inspection. Milk having a high cell content should, however, be regarded with suspicion.[21] Such milk should be traced to its source and the cow yielding it excluded or kept under close observation if not showing definite physical lesions.

The two methods for the determination of leucocytes in vogue, (1) smeared sediment, (2) volumetric, have each their advocates according to the view point of the worker, and each possesses in its distinctive sphere points of advantage which cannot be ignored. The volumetric method may be further subdivided, some of the methods devised being quantitative only, while others are qualitative as well.

The standards so far chosen have been more or less arbitrarily selected on what appears as rather inadequate data, and from a comparison of results it is apparent that much more comparative work needs to be done.

So much has been published descriptive of these various methods that references only can be given here.[22]

The smeared sediment method has been most used for city inspection work or work of that character where, through examination of many specimens, undesirable sources of supply may be cut off.

Its advantages along this line are:

1. Smallness of sample seized, 10 c. c. being ample for all necessary tests, including bacterial count, leucocyte and streptococci estimations.

2. Rapidity of operation, exact counting being unnecessary in routine work, and as has been proved through thousands of tests, nine out of every ten samples being practically free from suspicion.

3. Since in city inspection work a smear of the sediment is often made and examined for estimation of the number of bacteria present, it is profitable to make both tests at the same time.

4. The operation for many samples is much more simple than the volumetric, and less trying on the eyes.

5. This method has been shown to give consistently lower results than the volumetric.[23] If therefore, for example, 500,000 leucocytes to a c. c. are estimated by this method, it can safely be said that the milk contains greatly in excess of that number, and to that degree is much more suspicious than would be a volumetric determination indicating 500,000.

The volumetric method has been most used for careful research work where exact leucocyte content was to be determined as nearly as possible.

It is hoped during the coming year comparison of volumetric and smeared sediment technique may give us a more exact relation between the two, and that further work by those who have herds at their command may place these examinations upon a more satisfactory basis.

DETERMINATION OF STREPTOCOCCI.[22h]

Although by careful searching a few streptococci will be found in most sediments from pus milk, they are seldom found to any great extent by direct microscopical examination. Occasionally a sample will be found crowded with long chains; more often streptococci, if present, are in the form of diplococci or very short chains.

Where streptococci, diplococci or cocci are found in the sediment and the plate from the same sample contains colonies resembling streptococci colonies, these colonies may be grown in bouillon to see if chains will develop.

First make and record an estimate of the number of such colonies present, then transfer from ten to fifty of them to bouillon and grow for twenty-four hours at 37° C. To examine the bouillon culture spread a loopful on a glass slide, fix with heat, fix with alcohol while slide is still quite hot, stain with methylene blue, wash immediately, dry and examine.

Streptococci in small numbers are present in most market milk as shown by Heinemann, and many of the short chain varieties are undoubtedly at the time harmless, though by passing through animals their pathogenicity may become marked.[24]

Long chain streptococci are considered more apt to indicate inflammatory reactions,[25] and milk containing these in large numbers is certainly not a safe article of diet.

A milk should not be condemned because a few chains are found together with large numbers of other microscopic organisms in a bouillon culture, but it is safer to exclude a milk from the market when these three tests agree:

1. Microscopical examination of the sediment shows streptococci, diplococci or cocci.

2. The plate from the same samples shows colonies resembling streptococci colonies exceeding a count of 100,000 to a cubic centimeter.

3. The bouillon culture from these colonies shows long-chain streptococci alone or in great excess as compared with the other bacteria present.

Milk showing in the stained sediment both abundance of long-chain streptococci and a high leucocyte content should be condemned as unsafe.

MICROSCOPIC ESTIMATE OF BACTERIA.[26]

A milk sediment properly prepared and examined under the microscope with a one-twelfth oil immersion lens gives a very fair idea as to the number of bacteria present.

It is also fairly easy to determine through the microscopic examination what dilution will be necessary for plating in order to ascertain as correctly as possible the number of bacteria present.

DETECTION OF GAS–PRODUCING ORGANISMS IN MILK.

WISCONSIN CURD TEST.[27] The Wisconsin curd test is conducted as follows:

1. Sterilize milk containers so as to destroy all bacteria in vessels. This step is very important and can be done by heating cans in boiling water or steam for not less than one-half hour.

2. Place about one pint of milk in a covered jar and heat to about 98° F.

3. Add ten drops of commercial rennet extract and mix thoroughly with the milk to quickly coagulate.

4. After coagulation cut curd fine with case knife to facilitate separation of whey; leave curd in whey one-half hour to an hour; then drain off whey at frequent intervals until curd is well matted.

5. Incubate curd at 98° to 102° F. by immersing jar in warm water. Keep jars covered to retain odors.

6. After six to nine hours' incubation open jars and observe odor; examine curds by cutting same with sharp knife and observe texture as to presence of pin holes or gas holes. Observe odor.

7. Very bad milks will betray the presence of gas-producing bacteria by the spongy texture of the curd and will have an off flavor.

8. If more than one sample is tested at the same time, dip knife and thermometer in hot water before each time used.

Milks showing the presence of gas or bad odors in any considerable degree are milks that have been more or less polluted with extraneous organisms or carelessly handled, and as a consequence such milks show a curd filled with small pin holes due to gas. It is not intended that this test should be used for absolute indication of the presence of gas-producing organisms, but rather it has been of service in the detection of the condition of market milk.

OTHER METHODS OF DETECTING GAS-PRODUCING ORGANISMS IN MILK. Gas-producing organisms in milk may be tested for, as in water, with glucose or lactose broth in fermentation tubes. Tests similar to presumptive tests for B. coli in water analysis may be made by inoculating into these broth fermentation tubes a c. c. each of the 1-100, 1-1,000 and 1-10,000 dilutions, or if B. coli organisms are to be numerically determined the milk may be plated in lactose litmus agar, red colonies counted and species tests worked out. Lactose-bile medium has also been used for the determination of B. coli in milk.[28]

The presence of these gas-producing organisms in abundance usually indicates dirty condition of stables, cows or vessels. In small quantities they may be found in most milks.

A rough test[29] is to place five tubes of the milk to be tested at 20° C., 27° C. and 37½° C., observing time and character of the coagulation and the odor.

This test does not require extra apparatus, uses but little milk, does not require rennet and in the hands of one familiar with the fermentation of milk gives good results.

DETERMINATION OF ACIDITY.[30]

While milk is still fresh, *i.e.*, before it has begun to undergo lactic fermentation, it will show an acid reaction which is sometimes expressed in terms of lactic acid. In view of the fact that the acidity of "sweet" milk is due partly to the presence of acid phosphates and partly to dissolved carbonic acid in milk and not to lactic acid, which is probably absent, a better plan is to express the acidity in terms of the number of cubic centimeters of tenth normal alkali necessary to neutralize a given quantity of the milk, either 25 or 50 c.c., using phenolphthalein as an indicator.

If it is desirable to calculate the acidity in terms of lactic acid, multiply the number of cubic centimeters of tenth normal alkali used by 0.897 and divide by the number of cubic centimeters of milk titrated, the result being the percentage of lactic acid. For all practical purposes the factor 0.9 instead of 0.897 may be used. For field work acidity of milk may be measured quite accurately by the alkaline tablet method.[31]

SPECIES.

In the determination of species the Committee refers to the recommendations of the Committee on Water Analysis.[32]

RECORDS.

A card catalogue is far superior to any other method of keeping records.

A series of working cards may be kept in order of the date and duplicates entered in another series in order of the place obtained, thus making it easy to refer to any day's work or to any special dairy.

Cards of different colors may be used to distinguish the different sources, such as samples taken from stores, teams, etc.

The collector may take cards with him and enter details as he takes his samples, or the sample number may be written on the test tube and the details opposite the same number in a notebook, cards being copied from the notebook on return to the laboratory.

STERILIZATION.

DRY STERILIZATION. Petri dishes, pipettes, empty test tubes, etc., are usually sterilized by dry heat.

A common gas-stove oven of large size may be used.

Empty test tubes are sterilized when the heat causes the cotton plugs to turn slightly brown; petri dishes and pipettes should be exposed to the full heat for at least one-half hour, and are best sterilized in dust-proof copper boxes in which they may be kept sterile for a long time.

Such a petri dish box may be made 4½ x 4½ x 10 inches, with a hinged cover on one side closing over the edges and a ring handle on top.

A convenient pipette box is one 11 x 2 x 2 inches, square in section rather than round to prevent rolling, with a ring handle on the end cover.

These boxes must be made without solder, on account of the heat to which they are to be exposed in dry sterilization.

AUTOCLAVE STERILIZATION. Media, dilution water, and the rubber stoppers used in the centrifugal apparatus should be sterilized in the autoclave.

They should be kept under fifteen pounds steam pressure, which gives a temperature of about 250° F. for at least half an hour.

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APPENDIX

A. HEINEMANN.

Comparison of fourteen samples of milk plated in peptone lactose agar and nutrose lactose agar at 21° C. and 37° C. (owing to lack of space, only averages are given):

AVERAGES.

Medium.	Temperature.	Number of Days of Incubation.	Number of Bacteria per c. c.
Peptone lactose agar . .	21°	3	3,382,857
Nutrose " " . .	21°	3	3,185,716
Peptone " " . .	37°	1	418,000
" " " . .	37°	2	2,924,000
" " " . .	37°	3	3,002,000
Nutrose " " . .	37°	1	182,000
" " " . .	37°	2	3,245,000
" " " . .	37°	3	3,066,666

B. PRESCOTT.

Comparison of sixty plates on lactose and plain agar. Plain agar made according to Bacteriological Committee on Water, 12 grams to a liter, reaction +1.5. Lactose agar the same with addition of 2 per cent lactose.

On 20 plates, 33⅓ per cent, the count on lactose was greater.
On 17 plates, 28⅓ per cent, the count on plain was greater.
On 16 plates, 26⅓ per cent, the count was alike.
On 7 plates, 11⅔ per cent, one plate was uncountable.

C. SLACK.

Table showing the increase in the number of spreaders as the length of time of incubation is increased and the variation according to the composition of the medium.

One hundred and seventy-four samples, each plated on four different media, making a total of 696 plates. Porous covers used. Plates examined at the end of 24, 48, 72 and 96 hours. Incubation at 37° C.

	24 Hours.				48 Hours.				72 Hours.				96 Hours.			
Media Number	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Percentage of Spreaders .	4½	6	5	4½	8	17½	12	10½	13	24	26	17	16	29½	33½	21
Average per cent of Spreaders	5%				12%				20%				25%			

D. SLACK.

Tests to show whether or not bacteria increase in the test tube collecting case. (The temperature in this case is about 34° F.)

ACTUAL COUNT OF COLONIES 1-10,000 DILUTION.

Original Count.	After 4 Hours in Case.	Original Count.	After 7 Hours in Case.
5	2	136	122
0	3	133	152
8	6	146	163
8	8	830*	390*
4	4	122	114
11	8	200	183
274	221	66	74
112	101	97	79
263	200	22	21
18	5	88	103
220	315		
196	143		
650	420		
70	60		
411	305		
275	235		
156	171		
115	159		

* There was evidently some technical error in the plating of this sample.

Original Count.	After 6 Hours in Case.	Original Count.	After 4 Hours in Case.	After 24 Hours in Case.
52	43	589	586	578
1178	1016	816	834	633
1363	1084	607	670	703
1216	1075	258	230	291
192	196	895	930	960
93	81	78	66	76
37	24	177	151	123
322	258	83	69	77
298	309	92	133	103
36	39	124	82	95
		2	1	1

Since the variations are hardly more than might be expected in duplicate plates made at the same time, we conclude there is not only no increase in the number of bacteria between time of collection and plating, but usually a slight decrease.

E. SLACK.

Tests to show whether or not bacteria increase while dilutions are being made and ultimate fate of milk bacteria in water.

Original Count.	After 15 Min. in Dilution at Room Temperature.	Original Count.	After 4 Hours in Dilution at Room Temperature.	After 24 Hours in Dilution at Room Temperature.
54	40	150	28	Est. 1000
2	1	415	147	Innumerable
3	0	1085	133	Innumerable
5	15	655	92	Innumerable
315	347	Est. 2400	680	Innumerable
143	117	257	115	Est. 1100
60	56	Est. 1500	202	17
137	135	Est. 1200	311	Innumerable
73	71	Est. 1200	369	Innumerable
100	87			
25	10			
101	102			
132	143			
59	59			
66	61			
3	3			
158	147			

Original Count.	After 6 Hours in Dilution at Room Temperature.	After 28 Hours in Dilution at Room Temperature
10	8	Innumerable
11	8	Innumerable
6	3	Innumerable
20	1	18
562	102	160
6	0	63
9	7	Innumerable
0	0	1
80	2	10
93	12	Est. 600
102	10	112
0	1	0
1	3	0

From these experiments we are led to conclude that during the few minutes the milk is in the dilution water there is no increase in the number of bacteria. On the contrary, for the first few hours there is usually a marked decrease which sometimes persists, but usually forms are present which eventually multiply exceedingly.

F. STOKES.

Stokes recommends a copper box holding twelve two-ounce sterilized glass cologne bottles, etched with diamond ink for labeling. These bottles are held in flat tin holders, having intervals between each series of four in which ice can be placed. Each bottle has wire attached wrapped around the neck and the stopper. This can be pulled out so that the bottle can be slipped in each milk can without contaminating the cans from ladles slipped in other cans, or by the fingers of the inspector. Bacteriological and chemical tests are carried out with these samples.

G. HEINEMANN.

Recommends as the result of repeated measurements filling dilution bottles to 100 c.c.; approximately 99 c.c. remaining after sterilization.

H. CAMPBELL.

Tests comparing the plating of 1-20 c.c. of whole milk with the ordinary dilution methods.

TESTS COMPARING THE PLATING OF 1-20 C. C. OF WHOLE MILK WITH THE ORDINARY DILUTION METHODS.

1-20 c. c. Whole Milk.		Dilution 1-20.		Dilution 1-100.	
Number of Colonies.	Count.	Number of Colonies.	Count.	Number of Colonies.	Count.
712	14,240	1,109	22,180	401	40,100
688	13,760	1,042	20,840	365	36,500
181	3,620	257	5,140	98	9,800
173	3,460	229	4,580	87	8,700
660	13,200	870	17,400	220	22,000
720	14,400	680	13,600	200	20,000
185	3,700	415	8,300	141	14,100
616	12,320	1,030	20,600	331	33,100
202	4,040	210	4,200	49	4,900
200	4,000	237	4 740	128	12,800
232	4,640	129	2,580	71	7,100
340	6,800	....	....	224	22,400
449	8,980	....	....	217	21,700
128	2,560	200	4,000	....	....
110	2,200	240	4,800	....	....
118	2,360	128	2,560	....	....
96	1,920	140	2,800	....	....

I. GAGE.

A calibrating device copied from one in use by S. DeM. Gage of the Lawrence Experiment Station is convenient. By means of a three-way stopcock, mercury, from a reservoir, is filled into the tube to be calibrated, then a c. c. by weight is withdrawn and the tube marked. The whole system is first filled with mercury, care being taken to expel all air from the escape tube. The pipette to be calibrated is inserted, small end up, and filled with mercury from the supply tube until a drop stands on top; the flow is then stopped and the drop of mercury on top of the tube brushed off with the finger. Exactly 13.6 grams (1 c. c.) of mercury are then allowed to escape into the pan on the balances, the pipette is marked at the place where the mercury then stands with

hydrofluoric acid, then the remainder of the mercury in the pipette is run into the pan on the balances, the flow stopped and a new pipette inserted, the mercury in the pan poured back into the reservoir and the operation repeated.

Instead of weighing the mercury each time, it may be run as suggested by Wesbrook into an accurately graduated 1 c. c. receptacle. By rubbing the pipettes before calibration, while hot, upon a paraffin block, they may be coated at about the point where the mark will come. A ring cut through the paraffin at this point is filled with hydrofluoric acid for five minutes and leaves a fine cut mark.

J. STONE AND SPRAGUE.

Blood taken from ear at same time milk sample was secured. Blood count made with Thoma Zeiss counter. Milk counted by Doane-Buckley method. (Owing to lack of space details are omitted.)

Of the 58 cows examined there were 12, or 20 per cent, which showed a milk leucocyte count of over 500,000; 5, or 8½ per cent, with a milk count of over 1,000,000; and there were 7, or 12 per cent, with a blood count of over 10,000 leucocytes per m. m., and 1, or 2 per cent, with a blood count of over 20,000. The number with a low blood count (under 6,000) was 20, or 34 per cent.

The number having both a high blood and milk count was nil, and the number with a low blood count and a high milk count was 6, 10 per cent of the whole number, and 50 per cent of the number showing high milk count.

There seems to be absolutely no relation between the number of leucocytes in the milk and the general leucocyte content of the blood, thus indicating that a large number of leucocytes in the milk points to a local condition, if of any consequence at all.

That a high leucocyte count in either blood or milk is a comparatively constant factor is indicated, since in nearly

every case second and third counts correspond very closely with the first.

K. RUSSELL AND HOFFMANN. Modification of Doane-Buckley method for estimation of leucocytes.

COLLECTION OF SAMPLE.

Sample for analysis should be taken from the entire milking of the animal, as the strippings contain a somewhat larger number of cells than other portions of the milk. For the purpose of examination take 200 c. c. in stoppered bottle.

TIME INTERVAL BETWEEN COLLECTION AND ANALYSIS.

To secure satisfactory results, milk must be examined in a sweet condition. Development of acidity tends to precipitate casein in the milk, and thus obscure the examination of microscopical preparations. Samples received from a distance can be preserved for satisfactory microscopical examination by the addition of formalin at time of collection — proportion of 1 c. c. to 250 c. c. of milk. Formalin has been found the best preservative to use, although it causes contraction of the cells to some extent.

PROCEDURE WITH REFERENCE TO PREPARATION OF SAMPLE.

1. HEATING SAMPLE.

To secure the complete sedimentation of the cellular elements in the milk, it is necessary to heat the same to a temperature which will break down the fat globule clusters, or lessen the ordinary creaming properties of the milk. Samples should be heated at 65° to 70° C. for not less than ten

minutes, or from 80° to 85° where very short periods of exposure (one minute) are given. This treatment causes the more homogeneous distribution of the fat globules through the milk, and when the sample is then subjected to centrifugal force the cell elements are not caught in the rising fat globules, but on account of their higher specific gravity are concentrated in the sediment by centrifugal force.

2. CONCENTRATION OF CELLULAR ELEMENTS.

Ten c. c. of milk are placed in an ordinary sedimentation tube, and after heating as above directed, and subsequently shaking, the milk is centrifugalized twenty minutes at 1,200 revolutions per minute. A hand centrifuge may be employed for this purpose, but where available a steam turbine Babcock milk tester may be found more practicable.

Note. — This speed, maintained for the time mentioned, is sufficient to sediment practically all the cell elements suspended in the milk. In our experience we have found the number of cells in supernatant milk to average only 3½ per cent.

3. PREPARING THE SAMPLE FOR EXAMINATION.

After centrifugalizing, the cream and the supernatent milk are removed, with the exception of the last half c. c., by aspirating with an exhaust pump and wiping the walls of the tube with a cotton swab. After thoroughly mixing the sediment with a glass rod, enough of the emulsion is placed in an ordinary blood counter (Thoma Zeiss pattern) to fill exactly the cell. The preparation is then allowed to stand for a minute or two to permit the cellular elements to settle to the bottom of the cell, while the few fat globules in the liquid rise to the surface. This method permits of the differentiation of the cells from the small fat globules, so that a distinct microscopic observation can be made.

EXAMINATION OF MATERIAL.

The preparation is examined in an unstained condition.

NOTE. — Most observers have usually stained the sediment prior to examination, but we have found with the above treatment that the cells may be enumerated quite as well in an unstained as a stained condition.

The count is made with a 1-inch eyepiece and $\frac{1}{6}$ objective. Where the number of cell elements exceeds 12 or 15 per microscopic field, above referred to, one-fourth of the entire ruled area of the counter, equivalent to 100 of the smallest squares of the cell, are counted. Where the cell elements are less abundant, one-half of the cells in the entire area (two to four hundred squares) are enumerated. The average number of the cells per smallest square is then obtained, which, when multiplied by 200,000, gives the number of cells per cubic centimeter in the original milk. (If multiplied by 4,000,000, we have the number of cells per cubic centimeter in the sediment examined. As the sediment represents the concentration of the cells into one-twentieth of the original volume of milk taken, 10 c. c. to one-half c. c., this number should be divided by 20 to give the number of cells per cubic centimeter in the original milk.)

NOTE. — The above factor of 4,000,000 is obtained as follows: The cubic content of the blood counter represents one-tenth of a cubic centimeter. This volume is divided by means of the ruled scale into 400 small cubes, each equal to one four-thousandth of a cubic millimeter, or one four-millionth of a cubic centimeter.

EXPRESSION OF RESULTS.

All results should be expressed in numbers of cells per cubic centimeter of the original milk, and in order to avoid fictitious accuracy, should be given in accordance with the method adopted by the Committee on Standard Methods of Water Analysis, as reported in this Committee's report

to the Laboratory Section of the American Public Health Association for 1905, page 94.

L. SPRAGUE.

Comparison of Doane-Buckley and Hill-Slack (modification of Stewart's) methods of estimation of leucocytes:

Cow.	Hill-Slack Method.	Doane-Buckley Method.
1	252,827	580,000
2	241,100	485,000
3	548,900	875,000
4	252,800	595,000
5	199,600	510,000
6	249,500	985,000
7	282,700	899,000
8	332,600	570,000
9	532,200	640,000
10	153,000	846,000

REPORT OF THE COMMITTEE ON STANDARD METHODS OF WATER ANALYSIS, 1907

A Committee on Standard Methods of Water Analysis was appointed at the meeting of the Laboratory Section of the American Public Health Association at Minneapolis in 1899. As a result of the appointment of that Committee an elaborate report on standard methods of water analysis was made at a meeting of the section at Havana in January, 1905, and this report was published in the Journal of Infectious Diseases, Supplement No. 1, May, 1905, and reprints of this report bound for distribution.

It was attempted in that report to give in full such methods of physical, chemical and bacteriological examination of water as at that time met the approval of the Committee, were used in up-to-date laboratories, and could be recommended for general use. Since the publication of that report, three years ago, no attempt has been made by the Committee to again report at any length upon this subject, and the Committee as now formed does not believe that it is either desirable or feasible to make any extended report at the present time. It believes that such reports as that of 1905 enter so elaborately into all details of sanitary water analysis that taken as a whole they should stand for a number of years, probably for five years at least.

The Committee recognizes the fact that new methods of both chemical and bacterial analysis and improvements upon older methods are being constantly proposed and practiced, but the Committee believes that such new methods or improvements of older methods should not be incorporated into a report upon standard methods until after a season of trial in many laboratories. The Committee also recognizes that methods of analysis, useful and of some value in some laboratories, are of less value in others, owing to local conditions, the class of waters to be examined, etc. At the

present time therefore it is not proposed to make anything in the nature of a new report, but simply to suggest such work in various laboratories as will be of help to the Committee when the time arrives for a new report to be submitted and published. At the present time few changes of or additions to the chemical methods presented in the report of 1904 have been suggested to the Committee, and such as have been suggested need, in the opinion of the Committee, a thorough trying out. It should be the aim of laboratory workers, as well as of the Committee, to investigate and approve methods that are an actual improvement over older methods, and not simply different from these older and standard methods. If the new methods are intended to save laborious laboratory work and yet accomplish as good results, both labor saving and accuracy should be proved before the methods are adopted.

It is suggested that it may be necessary for this Committee to formulate methods for the interpretation of water analysis, but it is doubtful in the minds of some of the Committee whether such a procedure is necessary.

The following chemical methods are perhaps worthy of study at the present time:

The so-called Brucine method for the determination of nitrates.

The determination, by the so-called methylene blue test, of the stability or non-putrescibility of the effluents of sewage filters.

Studies of the value of the various methods for the so-called oxygen consumed determination.

The practicability of direct nesslerization for the determination of free ammonia, and for the direct reading method for Kjeldahl nitrogen.

Some of these methods when tried in certain laboratories, during the past few years, have been pronounced of little value, while in other laboratories a different estimation of

some or all of them is held. Before any of these methods of analysis are deemed worthy of being incorporated in a report upon standard methods, however, many laboratories should be heard from in regard to them.

In bacterial work it is suggested that a standard method for the determination of the colon bacillus should be formulated, and it is proposed that certain features of the usual method be modified as follows:

a. By omitting the determinations of motility.

b. By omitting tests for coagulation of milk when cultures have been isolated by lactose agar plates.

c. By omitting determinations of the amount of gas formed and the gas ratio in either presumptive or confirmatory tests.

d. By allowing the use of bile broth as an alternative for Smith's solution or pepton dextrose broth.

It is also suggested that agar be substituted for gelatin as the standard medium for the determination of numbers of bacteria, and in this connection it is believed by some that counts of bacteria should be made on plates incubated at at least two different temperatures.

It is also suggested that the Committee should consider the formulation of some standard method for the determination of streptococci, for enteritidis sporogenes and for S. choleræ.

During the coming year, therefore, the Committee, if continued, proposes to secure in various laboratories special investigations of the points mentioned, and will report in regard to these investigations, etc., at the next annual meeting.

Respectfully submitted,

H. W. CLARK,

Chairman, for the Committee.

The Massachusetts Association of Boards of Health

OCTOBER QUARTERLY MEETING
Boston, Mass.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Hotel Brunswick, Boylston Street, Boston, on Thursday, Oct. 31, 1907, President Walcott presiding.

After luncheon the President called the Association to order for business.

On motion of Dr. Durgin, the reading of the records of the July meeting was dispensed with.

Upon the recommendation of the Executive Committee, the following gentlemen were elected members of the Association:

Sidney J. Wright, of the Holyoke Board of Health.

Samuel C. Prescott, Massachusetts Institute of Technology.

Walter E. Kruesi, Secretary, Boston Association for the Relief of Tuberculosis.

William H. Fennell, of the Lawrence Board of Health.

THE PRESIDENT. The first business of the afternoon is a paper by Dr. Stowell of Boston, upon "The Possibilities of a Clinical Laboratory in a Country Town in Relation to Public Health Work."

THE POSSIBILITIES OF A CLINICAL LABORATORY IN A COUNTRY TOWN IN RELATION TO PUBLIC HEALTH WORK

By DR. E. CHANNING STOWELL
Boston, Mass.

Mr. Chairman, Ladies and Gentlemen: When I was asked to tell the story of the little clinical laboratory, established in Dublin, N.H., I was glad to comply, because I hoped that hearing of our experience others might go and do likewise.

I am in practice there in the summer. Several years ago it appeared that there were cases of illness occurring during the summer for whose proper care I needed the services of a laboratory. There was an occasional case of diphtheria brought to the town by some of the servants who had been on a holiday to neighboring communities or by visitors from elsewhere. There were groups of cases of streptococcus infection. There were occasional cases of typhoid, brought from the steamer by returning travelers or from other infested places. I have never known a case of typhoid to originate in that community in the ten years that I have been there. Then there were groups of cases of intestinal infections occurring in the hottest part of the summer in both adults and children, due in all probability to a faulty milk supply. There were also every year groups of other infections, taking the forms of sore throats, of bronchitis, or of diarrhœa, which occurred sometimes early, sometimes late in the season.

I felt that I needed a laboratory as a tool to properly investigate and treat these series of cases. In the fall of 1906 I made an appeal to some of the men and women there. I approached, at first, only a few, for the reason that the fewer

interested during the first years, until the experiment was thoroughly tried, the less discussion, the less trouble there would be. Those who were spoken to were the right persons, and they agreed to raise a sum of $1,000 for the equipment of a laboratory and the salary of a laboratory worker for one year, as an experiment.

During the winter while I was formulating a plan and testing the possibilities and difficulties of the project much encouragement was given by those who were interested in public health in Boston. Professor Sedgwick, Professor Leary and Mr. Rickards all gave me much help and advice and sympathy. The greatest difficulty to be overcome was the fact that a country town has no gas supply. We could not afford to establish a gas plant of our own. We had to rely upon oil for heating the incubator, for the sterilizing apparatus, for the blast lamp and for cooking purposes. Alcohol, except in a small way, would not have been satisfactory for the above purposes. There is an electric lighting plant in the town, but the power available is limited and the light is only supplied from sunset until midnight. There are incubators on the market which have a water-jacket and are heated by a kerosene lamp. Up to the present we have not been able to work these satisfactorily. This summer we have used a Cyphers chicken incubator. This machine, as you know, has no water-jacket, but the interior is kept warm by a current of heated air. After a long series of careful temperature tests, we became acquainted with the eccentricities of the machine and were able to use it with excellent results throughout the summer. Standard solutions, serum media and some special test solutions we bought of reliable makers in Boston. Our glass and chemicals we obtained through the regular dealers.

Then came the question of a building. One of the residents offered me a barn. It was an ancient structure and had originally been used as an ox barn. Later, when the farm

was no longer worked, it had been used as an artist's studio, and picture exhibitions had been held there. One summer Carl Baerman used it for a practicing room and gave a Beethoven recital there. Finally this year it fell into the hands of the bacteriologist. With the aid of a handy carpenter we fitted it up with benches and sink and desks, so that our work went very smoothly. We had no running water in the building, so all our water was carried in pails a distance of 200 feet from the lake. This was a labor of love on the part of the laboratory assistant. The distilled water we bought in carboys in Boston. The assistant, Dr. Wm. H. Sayward, Jr., of Wayland, was a gentleman highly recommended by Professor Sedgwick, who had taken up laboratory work for the time. He came to us for a salary of $75 per month, and we were able to give him for himself and family the use of a small cottage on one of the estates of a summer resident, who had been exceptionally generous in helping the laboratory.

The work we undertook to do was, in the first instance, the study of the local mosquito question. As far as we know the anopheles have not been found in Dublin. The problem, therefore, was not of the mosquito as a disease carrier, but as a pest and discomfort to the community. This study took a great deal of time and labor off and on during the season, but led to such definite results that we were able to make some suggestions for work next year, which promises to be of benefit to the whole community.

Then we took up the sanitary analysis of drinking water, and we were enabled to point out several unsafe sources of water supply as well as to prove that other suspected sources were excellent. A great many of the summer residents get their water from Dublin Lake itself. A careful study of this water was made at different times, under different conditions and at different stations. This study and its results we hope to publish.

We also studied the milk of one producer quite carefully all through the summer. We did him a great deal of good, and through him the other milk producers of the neighborhood; for he came to see that the bacterial count varied directly as there was extra care or carelessness at the barn and dairy. This of course he saw was to be a matter of dollars and cents with him another year. It was due to our counts that he was enabled to charge ten cents a quart for his milk. Also we did the ordinary clinical examinations of the urine, of blood, of pus and of throats. We were prepared to examine for tubercle bacilli and also do the animal inoculation test. We did the Widal reaction. We were prepared to make chemical examination of stomach contents, and for lead and arsenic; in short, to do all the ordinary medical laboratory work and to serve as a go-between in any extraordinary tests.

The use of the laboratory during this first summer was in the main confined to the little community of Dublin. The hope, however, is that interest will spread, and that it may be made use of by all the medical profession of the county. No great attempt was made this summer to advertise the work that we were trying to do; but not a few calls for examinations were made from near-by towns. The year's report of work done was satisfactory to the contributors, and we have the assurance of their support for another season. The expense amounted to between $600 and $700, of which $300 was for the salary of the assistant.

THE PRESIDENT. This interesting account of a new machinery to assist us in our public health work is now before you for discussion or for question.

DR. DENNY. I think the subject which Dr. Stowell has brought up is a very important one, especially for boards of health. Boards of health are establishing laboratories in comparatively small places now, and a great deal of the work which Dr. Stowell has spoken of doing in the laboratory

at Dublin might be done in these laboratories. In addition to the diagnosis of contagious diseases, examinations for the diagnosis of the non-contagious diseases might also be made. Great progress has been made in medical science during the last few years in clinical microscopy, but the community as a whole has very little benefit from these advances. A laborer in the city, a foreigner perhaps, is taken to one of our city hospitals when he is sick and has the benefit of a clinical laboratory to aid in the diagnosis and correct treatment of his case. But outside of the large cities the citizens of this Commonwealth have very little benefit from the progress that has been made in medical science along these lines, and I think that the board of health laboratories could undertake very well to do some of this work. In 1899 the Brookline Board of Health undertook to make such examinations in the laboratory in Brookline, and a circular, signed by the Board of Health, was sent to all the physicians, which began as follows:

"Believing it to be in the interests of the public health that there should be a laboratory in the town where the various microscopical and chemical examinations now used in the diagnosis of disease can be carried out, the Board has decided to afford facilities for the making of these examinations in the laboratory recently established for bacteriological work. These examinations will be made for a moderate fee for any physician of the town or for any physician who is attending a resident of the town."

These facilities have been made use of only to a limited extent, but I think the physicians of the town have appreciated it. The influence of a laboratory and the habit of coming to the laboratory and making use of such examinations raise the standard of medical practice. Instead of working in the dark a physician naturally stops and thinks what he can use to aid in the diagnosis of his case. I am frequently called up by physicians, a case is described, and

I am asked if any examination will be of aid in the diagnosis of that case. I think that this habit of turning to the laboratory is a very helpful one. If there were more laboratories started where physicians could have the benefit of clinical microscopy the standard of practice in our suburban and country districts would be very much raised.

DR. WHEATLEY. I should like to inquire, through you, Mr. Chairman, of the last speaker, in regard to the expense in Brookline.

DR. DENNY. It is a source of income to the laboratory, because examinations which are of benefit to the individual only, and not to the community as a whole, should be charged for. These examinations have, therefore, been a source of income — very slight, but still something.

THE PRESIDENT. Dr. Emerson, have n't you had some experience with this matter in Springfield?

DR. EMERSON. Mr. President, this is a matter which has interested me ever since I went into the medical practice. I started in Springfield with a small incubator and microscope — that was about all I had at first — and began doing a little work locally for the Board of Health in diphtheria some ten years ago. Since that time our laboratory has developed, and we have done the work for the city of Springfield, making the ordinary bacteriological tests for diphtheria, tuberculosis and typhoid. I have also done considerable of that class of public health work for the neighboring cities and particularly the smaller towns, so that at the present time we do almost all of those tests for ten or more towns in our vicinity. By reason of doing the Board of Health work we have also developed quite a business in other laboratory work for the physicians in all of these cities. It has been very interesting to see how the work has developed, and how in the smaller towns, even villages of small size, the work has grown, and the interest that the men have taken in getting all the help that is possible from the laboratory

standpoint. Recently we have added still further upon the chemical side of the laboratory, so that we make all the laboratory tests which might be desired in a medical way, in medical chemistry, and also commercial chemical analyses. But the main part of the laboratory work has always been on the medical line, and as I say, it has grown very much, from doing work for Springfield to doing it for a large number of towns and very small towns.

THE PRESIDENT. The next paper of the afternoon is a paper by Prof. James O. Jordan of Boston, " Observations on the Present-Day Milk Situation." I have the pleasure of presenting Professor Jordan.

OBSERVATIONS ON THE PRESENT-DAY MILK SITUATION

By PROF. JAMES O. JORDAN
Inspector of Milk, Boston, Mass.

It has been previously observed that there was popular prejudice against increasing the price of milk, and no better illustration of that statement could be found than the recent agitation which has been filling columns of newspaper space. Prices of other commodities may soar almost without protest; in fact, during this milk controversy the very papers which have given the most attention to the question have announced substantial advances in the prices of flour and beef, but beyond mention of these increases no further notice was given the subject. Yet these commodities are household necessities, and the advances are of great importance to purchasers; but no journalistic furor followed either in the

editorial or news sense. There was no attempt on the part of the press to protect or protest in behalf of consumers. Meanwhile the efforts of the newspaper artists and writers were turned upon the milk situation to such an extent that ordinary phases of the subject were early exhausted, and then began a scramble for ideas with a semblance of newness until even the reportorial staff had more than a surfeit of milk assignments and craved a change. So it is safe to conclude that an advance in the price of milk is likely to meet opposition from the newspapers if not from consumers, while advances in the prices of other necessities are likely to be accepted with little or no protest. The recent attitude of the press is to be deplored, because valuable space has been devoted to a side of the question from which the public will receive little or no substantial benefit, and at the same time prejudice inimical even to sanitary milk supplies — from the price standpoint — has been unconsciously engendered. Would it not have been more beneficial if the columns of newspaper space — wasted upon the price question — had been devoted to educating the public to the advantage of and substantial gain from the use of clean milk? The necessity for exploiting this subject upon an educational basis is apparent, and if this feature had been presented with as much energy and determination as that given to the cry for eight-cent milk, more New Englanders would now be demanding and securing the ideal variety than is the case at present. That would have been a praiseworthy attitude and of lasting benefit. But while the newspapers have not considered the subject from the standpoint of the best interest of the consumer, there are indications that it may bring about one permanent change, namely, a desire to end the semiannual bickerings over the price question. It is to be hoped that we have witnessed the last controversy of this kind, and that it will be possible in the future to adjust prices upon some new basis. While

these differences exist, high ideals in milk production or handling will be unattainable. A unanimity of interests is a necessity; until this condition prevails permanent gains are beyond reach. It is not the province of this paper to take issue with either side in this present price controversy, but the public and press — for a fair consideration of the issue — should not be unmindful of the fact that neither the production nor sale of milk are such alluring propositions as to invite the serious attention of capitalists. In view of this fact, is it not fair to assume that there are other callings which appear more remunerative for the investor? The public should know that the producing end of the milk business, outside of the present financial claims, means endless care and attention, that the milking of cows and oversight of product is necessary twice a day, every day in the year, Sundays and holidays included. Is not a situation like this, involving constant labor, worthy of serious consideration by the public? Do the press and public give due weight from the standpoint of the dealer — milkman — to a side of this price problem for which the consumers alone are blamable; namely, losses by bad bills and non-return of milk containers, cans and bottles, the latter either from motives of theft, carelessness or willful destruction? Remove these unnecessary and constant losses and the sale of milk will be established upon a more satisfactory basis. Yet these shortcomings of some consumers have an important bearing upon the price of milk, for the losses have to be at least partially borne by those who pay their bills.

While high prices do not necessarily mean clean milk, it is certain that milk produced under careful conditions cannot be secured for any considerable period at a low figure. Consequently those who desire clean milk must be willing to pay for it. But clean milk, regardless of price, is the cheapest variety to purchase.

Outside the price question, the public unfortunately is not earnestly interested in the milk problem. The quality even is not considered with enough seriousness to cause many consumers to go to a slight personal inconvenience to ascertain the facts concerning their supplies. The experience of the Bureau of Milk Inspection of the city of Boston supports this contention, for although the consumers in that city have been for years invited to avail themselves of the opportunity of having their supplies examined free of charge, not in recent years have enough purchasers taken advantage of this offer to average one sample per day; and this in a city having a population of over 600,000. Because of this lack of interest on the part of the consumer, is not the education of the public to the advantages accruing from the use of clean milk the greatest problem of all? And why is this latter classed as the most difficult feature? Because it means money; it reaches the pocketbook of the consumer, the one most deeply concerned, and at the same time most blamable for existing conditions. It is certain that until the public is brought to the point of demanding clean milk and being willing to pay for it, general supplies of this type of milk will be unobtainable. States may pass laws, boards of health may adopt regulations governing the milk traffic, and officials may enforce them,— as is now being generally done and more extensively than ever before in the attempt to bring about improvements,— but while laws and regulations may insure sanitary surroundings for all milk produced, they unfortunately do not guarantee that any milk will be raised at all. It would be as sensible to attempt to legislate that gold should be sold at the price of scrap iron, as to assume that legislation will give us clean milk while we are purchasing that commodity upon a dirty milk basis. Legislation is a great lever and is a necessary part of the cleaning-up programme, but laws can only partially solve the problem; beyond that point we must look to education

and enlightenment to complete the work. In fact, without adequate financial return for dairymen, it is a foregone conclusion that too stringent regulations demanding cleanliness will force many from the business. The latter are only human and they will do what others would do, if business was being carried on at a loss, or at least where a new dollar was not being returned for an old one, namely, abandon the production of milk. That condition already confronts us, for within the last year many farmers have ceased, for one reason or another, to produce milk. It is true that some of these men were ill fitted to engage in this traffic, but others have discontinued raising milk from financial reasons, and several of these were Massachusetts farmers and so located as to insure a product for Boston of medium freshness. All of this complicates the situation, as it means not only a possible shortage, but in any event milk from localities more remote from the consumer. In the usual conduct of the business this results in stale milk, a deplorable and usually unsatisfactory condition, but one which is at the present time unfortunately accepted as a necessity to supplies for the inhabitants of large cities. The tendency of this age is for those engaged in the milk traffic to seek at least a portion of their product from new localities, usually far removed from the consumer. This has an additional disadvantage beside that of the probability of a stale supply; namely, that the work of farm inspection has to be taken up anew in each territory, and it is not too much to assume that many of the new producers are ill equipped, either from the standpoint of temperament, or knowledge, or facilities, or all three combined, for the production of a high-grade milk. Thus there is a likelihood of a temporary return to old conditions, the time of duration lasting at least until the authorities or wholesale firms seek to have the farmer raise his milk somewhat in accordance with modern requirements. This is not infrequently a long process; meanwhile

quality suffers. The result then of the acquirement of new fields for milk supplies is detrimental in every respect, as it means ordinarily a loss to both consumer and contractor of older and near-by territory where some of the producers had the skill, intent, desire and facilities for producing milk of the commendable type.

The situation here is not so difficult or complicated but what, by slight changes in the method of conducting the business, much benefit would accrue. While fresh milk does not mean clean milk, no one can dispute that the fresh article is to be preferred to that which has had the experience of age. It cannot be maintained even that a clean brand of milk will improve by keeping, then what can be said of the existing condition by which no inconsiderable portion of our milk is delivered at the age of forty-eight, sixty and even seventy-two hours? Such aging might even imperil the quality of clean milk, and it is not difficult to conceive the influence of this ripening process upon much of the milk produced under the now existing conditions.

Boston and its surrounding cities and towns are in a milk-producing section of the country, and the population of these cities and towns is not so tremendous as to preclude the inhabitants receiving a supply of greater freshness than that now delivered. That it is possible to obtain milk of less staleness than that of the present day cannot be successfully disputed; but to bring about this important change two conditions are essential: one is that the consumer demand it to the extent of willingness to bear his share of the financial burden, and the other is that producers near by these cities and towns receive the proper stimulus and encouragement, not only to engage, but to continue in the production of milk. Thus all concerned — namely, consumer, producer and dealer — derive the benefit from having and being certain of supplies from the same producers.

There is ample territory not too far removed from these milk-consuming centers for the production of an abundant supply of milk, not only for the present but for years to come. It should be utilized for this purpose, and it would and will be if the right inducement is offered. And this inducement is, of course, a financial one; but that incentive ought to be sufficient, not only to give the producer a fair return on his invested capital, but to instill within him sufficient interest and progressiveness to produce his product under the best conditions, and a desire to remain in the business of raising milk. Then there will be co-operation, not only with the authorities, but with consumers and dealers. Conditions should be such as to develop competition among producers. This state of affairs governs other farm products, as it will that of milk when the quality idea predominates and the farmer receives satisfactory financial return for outlay and labor. Producers should receive and are justly entitled to the fullest financial encouragement. Neglect of the producing end of the milk traffic plays havoc with quality. Words cannot overestimate the importance of having milk leave the producer under the right and commendable conditions, and while it is not difficult to spoil good milk so produced, it is an impossibility to subsequently renovate milk previously impaired at the farm.

Is not milk one commodity where price should not be regulated by supply and demand? Are not quality and cleanliness the prime factors for fixing prices for this class of food?

Now what could be included under territory not too remote from Boston and its near-by cities and towns to insure a fresh supply of milk? Farms within 100 to 150 miles of Boston. Within this area there is sufficient acreage to furnish fresh milk to consumers, not only now but for a considerable period to come.

Milk from these farms should be produced under sanitary conditions, and cooled to below 50° F. at least within one

hour of milking. The cans in which the milk is to be shipped should be scrupulously clean, and even though the cans may have been returned by the contractor as "clean," if any doubt exists as to their condition that doubt should be removed by the cans being made clean by the dairyman before they are filled with milk. There should be no shirking of responsibility by those answerable for public milk supplies. The milk, the product of the morning and evening, should be taken to the station in the evening and there placed upon express milk trains composed of specially constructed milk refrigerator cars. The type of car which has been used in the past for transporting milk to Boston, and is now employed to a large extent, is antiquated and should be supplanted by the new-style milk car of the present day. One Boston firm is already operating a number of these cars. One of these cars, not including platforms, is 48 feet long to the outside of the sills. The inside measurement is approximately 8 feet 6 inches wide and 7 feet 6 inches high. This car is insulated as follows: there is an outside $\frac{7}{8}$-inch sheathing; then a 4-inch air space; then a 1-inch air space, and finally another $\frac{7}{8}$-inch sheathing. This provides insulation $7\frac{5}{8}$ inches thick. The roof construction is similar to that of the walls, with the addition that the monitor, which is 3 feet across and 18 inches deep, is sheathed in. The floor is $2\frac{7}{8}$ inches in thickness, being constructed of 2-inch plank, over which is laid $\frac{7}{8}$-inch floor boards. The car has one tightly fitting refrigerator door in the center on each side, in addition to the two end doors.

A car of the old pattern has an office in the center for the accommodation of the men in charge, and in cold weather this office is heated. The ends of the car are reserved for milk, and there are four closets in each end of the car. When the closets are filled the floor space outside is utilized for storage of milk. Each end of this car has four doors, one on each side (both sliding doors), and one end door leading

to the platform, and another door leading to the office. This gives eight doors per car to four doors for the new-style car. The end doors in the old type of car are frequently opened and afford an opportunity to go through the train. Thus air may be admitted from the end door to the parts of the car in which the milk is kept, and it is claimed that the sliding, poorly fitting side doors permitted air to be drawn in which increased the temperature of the milk in the summer, and in winter caused unnecessary freezing. Little or no attempt is given to insulation in the old cars, and they are not adaptable to ready cleansing.

The end doors of the new-style car are not used for passing through the train, for the reason that the car floor is covered with milk cans, and across the ends of the car there are shelves in which milk is placed.

There can be little doubt that in the new-style car, milk can be kept cooler than in the old-type car and at a less expenditure for ice. Actual use demonstrates that the refrigerator car can be loaded and unloaded more quickly than cars of the old pattern, and in addition the refrigerator car can be thoroughly and quickly washed with a hose.

While the refrigerator car is not a panacea for all of the evils attendant upon the production and sale of milk, its employment is advantageous, as it insures transportation of milk under improved as well as less expensive conditions.

It has been said that Boston's transportation facilities are entirely inadequate, and this assertion is true in respect to the carrying of milk. Slow trains are the rule, and some of Boston's milk is brought the whole or a part of the distance from the country upon mixed trains; furthermore, the trains often arrive late. Milk, although freight, should not be treated as such; it should be forwarded to consumers with express speed. The swiftly moving trains which have gathered the above morning and evening milk should arrive in Boston the same night; upon arrival the milk should be

immediately placed in bottles or cans, then loaded upon wagons and subsequently delivered to consumers in time for breakfast; this method of procedure to govern the regular and ordinary supplies of consumers.

Now this plan, although revolutionary and will meet with opposition, is feasible if approached in the right manner and spirit, and could be brought about at not a great expense over that of prevailing methods. Once in operation, it would entail less complaint from consumers and prove more satisfactory to dealers, because of decrease of amount of stale and sour milk. It would also lessen the quantity of ice required and practically eliminate the cost of storage. To the consumer the benefit from a fresh milk supply, half of which is twenty-four hours old and the other half only twelve hours old, would be substantial. But is the consumer ready to demand milk of this type, is he willing to bear his share of the financial burden and thereby enhance materially the value of his purchase, is he willing to forego the cream line upon his bottled milk, even though the milk be of equal richness? If so, and he is in earnest, the conditions are his for the asking.

Such a plan would do away with many of the troubles resulting from an old milk supply, and that is no inconsiderable portion of the difficulty. This idea is not advanced as an idealistic method, but as a means of providing a large community with fresh milk of fair quality, at a slight advance over ordinary prices

THE PRESIDENT. Dr. Norris, you have had some experience with this matter as a local health officer. We shall be glad to hear from you about the matter.

DR. NORRIS. Mr. President, I have been very much interested in Mr. Jordan's propositions, and although he stigmatizes them as revolutionary, it seems as though they were just the things that the consumers of the metropolitan

district have a right to demand. With more or less ill grace we have submitted to an increase in the price of milk produced largely under the standards that have existed for a few years. Now with the added price in their hands, it seems as though we should turn about and demand the quality standard which has been described so carefully by Mr. Jordan. The zone from which the milk is at present derived is one ever reaching farther and farther from Boston, and it seems to me that the time should come when a second wave should start out from the city and a zone that appears to-day more or less desolate over large areas, within forty miles of Boston, should be stimulated and given its just deserts, since from its geographical position it should be able to give us a large part of the fresh and clean supply we want.

DR. HASTINGS. Mr. President, I am sure we are all interested in what is being done, might be done, will be done, for the metropolitan district of Boston, but it occurs to me that perhaps the members here may be interested to know a little as to what a local district can do if it will for the betterment of its milk supply. Last spring the Norfolk District Medical Society at one of its meetings discussed the milk question to some degree. That includes the town of Brookline, part of Boston (through Roxbury and Dorchester), Milton, Dedham and off through that way into Norfolk County. As a result of that discussion a committee was appointed to see whether anything could be done to better the milk supply, or, rather, to find out who were furnishing the best milk supply, fresh milk supply, for that district. The committee reported that we could find out if we would who were the milkmen in that district who were furnishing good milk, or who were trying to furnish good fresh milk, out through that portion of Boston and the suburbs.

A commission was appointed, of which I chance to be secretary, and one of the members of the society, also a

member of this Association, Dr. Wardwell, was willing to undertake the inspection of the milk supply so far as we could go. Now that was just a start. Since that time he has been able to cover perhaps 150 of those who are furnishing milk to that portion of the state, with some assistance by the other members of the commission. We have been able to report to our Norfolk District twice, once in August, once only a few days ago, the first list being revised in the second statement. Our effort has been to furnish to the doctors in our district a list of farmers, of producers, or of contractors in a certain few cases, who are making an effort to furnish reasonably clean milk. Some of you hear a good deal about "certified milk." Dr. Norris is very much interested in "certified milk"; so am I. Dr. Morse in Boston is very much interested in "certified milk." Certain other specialists in that line of work are very much interested in "certified milk," meaning by that a milk that is produced under absolutely ideal surroundings and methods, and which has a very low bacterial count. Boston (the Suffolk District) makes it 10,000 per c. c. and I think Cambridge is the same. They insist that the milk producer shall meet all their requirements all the time, and there are not many milk producers that will do it. I think Cambridge has one, and Boston (Suffolk District) has one, the "Warelands."

It produces 300 quarts daily, a very inconsiderable amount, you will see, for that which might be needed. The Cambridge farm produces 1,000 quarts daily. Now it seemed to us that while that is ideal and a splendid thing for an example, as Dr. Morse said only a few days ago at the medical meeting where he reported, that it was not what we practically wanted. What we as doctors wanted to know was what farmers or what producers are putting reasonably clean milk into our hands. Where can we turn if we want real good milk for a baby and say, "If you get of that producer you may be pretty sure that you are getting good clean milk"? Dr.

Harrington of the State Board of Health approved our position, as did Dr. Durgin also. Professor Jordan has helped us very materially in showing that certain farmers are, certain others are not, doing what they ought from the bacterial point of view. In the last list that we gave to our members there are sixteen included. We tried to get at the larger producers so far as we could, because it was of more practical value to our constituents, to our doctors, to know some reasonably large producers, if possible. Dr. Norris has spoken about there being few producers near Boston, but taking Brookline, for instance, we find that there are 250 different firms or individuals bringing milk into Brookline. For our inspector or any series of inspectors to go over all of those in a very limited length of time you will see is quite impossible, but it was possible for us to notify the Brookline doctors that there are half a dozen who we are willing to say are furnishing reasonably clean milk.

Now that is a thing that I believe the other districts in the state can do, if they will. Other towns, other cities, can do it if they will, without much expense, if they can get hold of somebody who is interested in the subject, as Dr. Wardwell is, and who will be doing as he is doing, as we think we are doing, a real service to the community in being able to tell the doctors who are producing the best milk in that community. We do not make any negative statements, "so and so" is on the list, others are not on the list, and they may find out why if they want to, but we do not intend to make any negative statements by saying that "so and so is producing bad milk." That may or may not be true. It may be that an inspection has been made of that farm, it may be that it has not. But you will see that out of 150 we found only sixteen to be producing or trying to produce what we are willing to call inspected or reasonably clean milk.

I thought possibly, as this topic came up here, that it would interest you to know what one district medical society

is trying to do, and what it has done; perhaps others may through the State do something of the same sort. If we only will, we can convince the farmers outside that it is worth their while to be clean. They have to get their money, as Professor Jordan has said. They have not made much money, as those of us who live out in those regions or go out there through the year know, and we must pay more for it in towns and in the cities if we want the real, good, clean milk. We believe we do want it, as medical men, and the farmers are going to furnish it when they can be persuaded that customers will pay a little extra for extra cleanliness and care.

THE PRESIDENT. I wish there were some other gentlemen present who could repeat the capital statement which Dr. Hastings has made to us. Failing that, I hope we may hear from some of the gentlemen who are responsible for the production of milk.

MR. GEORGE H. ELLIS. Mr. President, I am of course thoroughly in sympathy with Dr. Jordan's paper, but approaching the matter, as I do, from the producer's standpoint, I feel perhaps more keenly than he does the necessity for the higher price for milk. Without taking any side of the present controversy, — I know nothing as to the inside merits of that case, — I do know that the farmers of this country cannot produce milk such as should be supplied in the city of Boston at less than, nor ought they to be asked to supply it for, forty cents a can. I have no hesitation in saying that as a matter of fact.

In my own case I have undertaken to produce milk on a somewhat large scale, it might almost be called on the factory plan, — manufacturing milk. It is not in any sense a side issue; it is our business at the farm. We are trying to produce sanitary milk; not certified milk, because when you come to the matter of supplying so-called certified milk you have got to limit the output very materially. It cannot

be done at what most people would call a reasonable figure. The cost of bringing your bacteria content to below 10,000 to the c. c., and being absolutely sure that you can keep it there, is so great that certified milk cannot be produced and sold for less than from fifteen to twenty cents a quart, which will appeal to a very limited constituency. That is satisfactorily proved by the experience of the few who have tried it here, and as satisfactorily by those who are trying it in other states. There is not any question about that.

We are trying to produce a sanitary milk, and we frequently go below the 10,000; but to insure under all circumstances keeping below requires care and cost, heavy cost. I was a short time ago at Mr. Hazard's farm near Syracuse, N.Y. He furnishes certified milk which is sold in Brooklyn. They told me there that a windy day, with the windows open in their sanitary barns, would quadruple the bacteria content, however much care they would use.

I am perfectly willing to give a few facts from my own experience. I started to sell milk at eight cents a quart in the city of Newton, retailing milk directly from the cows and handling it in what we should say is a sanitary way. As time has gone on, I have been absolutely obliged as a business matter to raise that price, first to nine, then to ten, and now to eleven cents, and I cannot do business on that basis for any less money. And yet the papers are complaining because the price of milk is to be raised but one cent per quart.

The quality of milk in Boston, I think Professor Jordan will agree, has increased within the past few years much out of proportion to the cost of that milk, or, rather, to the selling price, through the efforts of his office, but the farmers are not getting a fair price. I am not criticising the contractors, the gentlemen who sit here. I presume they find the difficulty just as most of us do. The people have not yet been educated up to paying the price for the milk, and that

is where the education has first got to come in. Good milk, — I venture this statement, — milk such as you gentlemen would like to see supplied in the city of Boston, coming from the country as it does and through the hands of the contractors, cannot be sold in the city of Boston at less than ten cents per quart and return a proper amount to the producer. It simply cannot be done. In order to give you the milk that you want, and insure the quality that you want, the producer must have his fifty cents a can, and that means at least ten cents a quart retail in Boston.

It is fair to say that a part of the expense in my case — that ought not to be taken perhaps in the arbitrary way that I have stated it — comes in because we are furnishing a milk much higher in butter fat than is required by any standard, and higher than many people perhaps would be ready to pay for, our standard being five per cent. That accounts for a part of the increased cost to us, not merely that we are trying to manufacture the sanitary milk. That is, you might say, a matter of fancy, whether a man cares to pay for a five per cent butter fat or will take the Massachusetts standard. But that is another question.

The education has got to — well, I guess the place to begin educating is with the reporters on the newspapers. I don't myself believe that the people in this city begin to care about the increased price for milk as the reporters have made it appear. They have undertaken to create public sentiment against the producers and against the contractors and against the retailers, and they have succeeded to a very large extent; but they have not succeeded to the extent that might appear. I think that the very agitation itself has helped somewhat, for, again speaking from my own experience, when I have increased the price of milk before — and I am not now undertaking to advertise my business, I simply wish to state the facts — I have lost a considerable percentage of customers, and this time the increase from ten to eleven

cents has resulted in almost no loss at all. The people have accepted the situation. To that extent the newspapers have helped by their agitation to call attention to the increased and increasing cost. They have not put it in that way, but I think the common-sense housekeeper looks at it something as she would when she goes into the store and sees there the placards "Eggs," "Fresh Eggs," and "Strictly Fresh Eggs." She expects to pay a higher price for the "Strictly Fresh Eggs" than she does for the "Eggs," and if she buys the "Eggs" she does not expect to get anything like "Strictly Fresh Eggs." I do think that this agitation has helped to call public attention to the fact that there is a difference in milk, and they don't seem to have realized it heretofore. They have said "milk is milk," and the sooner we can educate them to understand something else the better.

MR. GRAUSTEIN. I think one trouble has been that we never have given the public and the consumers the facts as to what it costs to deliver a quart of milk. I have spent considerable time estimating the cost of delivering a quart of milk from the bottling room in Boston to the consumer. I want to draw your attention to the fact that forty-one different items enter into the cost of delivering a quart of milk. Just the bare expenses, without cost of overseeing, interest on money, or anything for accident, amount to 3.21 cents a quart to deliver a quart of milk from the bottling room to the consumer. If I had each item here I think you would agree with me that we could not dispense with one, and you would also agree that my figures are at least ten per cent too low on every item, if not more. There is more than one-third of the nine cents a quart that the milkmen, the retail milkmen, ask the consumer. You can readily see that, if it costs this much to deliver a quart of milk, what it must take to bring a quart of milk from the country to the bottling room; and what is there left for the producer? I am satis-

fied that neither the producer, the contractor nor the peddler has been or is receiving sufficient pay for the work that he does.

Those are facts that cannot be disputed, and I for one am ready to furnish all the evidence required to any disinterested board. I know that the other contractors will not agree with me on my figure of what I say it costs from the bottling room to the consumer, but I am willing to furnish them figures to show that it at least costs that and more. That is one of the reasons why we cannot produce a better article of milk for the consumer than we have, because you have not paid enough for it. In these items there is nothing for cans, which are always furnished by the contractor, and there is nothing for freight; as to the average cost of bringing a can of milk into the city of Boston it costs me 4.23 cents per can of eight quarts.

THE PRESIDENT. Mr. Whiting, we should be glad to hear from you on this matter.

MR. GEORGE WHITING. Mr. Chairman and Gentlemen: There could not be anybody more interested in this subject than I. I thought after Professor Jordan had read his paper that he had told about all there was to the question, but I found there was a little more when Mr. Ellis gave his side of it. Mr. Ellis's case seems to be rather different from that of anybody else in that he produces a superior quality of milk. He is rather in a class by himself. As the cost of production of milk increases it does not matter whether you make it excessively rich in butter fat or of a poorer quality. The cost of production goes up in Mr. Ellis's case the same as it does in that of the ordinary producer, so that Mr. Ellis and others who have touched on this point have not put it any too strongly that the price which was established in Boston on October 1, of this year, which is one cent per quart advance over what it has been in previous years, is not great enough.

But I feel that this subject has been enlarged upon rather more than was intended. I hardly think this is a meeting where you care to bring in the cost particularly or to dwell upon the present agitation that the newspapers seem to be working on so diligently. You will notice, however, that we have had very little to say in the matter, because we felt that those who gave this matter to the newspapers were shooting so wide of the mark that it was not worth while for us to make any reply, which course we have pursued up to the present time.

I think that something more specific should be said about that part of the subject which interests you as members of this Board. You are interested to know about the sanitary conditions, to know just what is being done in that line by the larger contractors who handle the milk. I made a statement a few meetings ago that we were subjected to great cost in inspecting our milk, both chemically and bacteriologically, and that we have now in our concern alone three inspectors who go about the country doing nothing else but looking after the conditions at the farms, and this we think is right in accordance with what your Board desires. Statements have been made in the papers that Massachusetts milk is superior to New Hampshire milk or milk in adjacent states. This is not a fact, for we realize that milk will not be accepted from other states, any more than from Massachusetts, if it does not come up to the requirements; so whether we would or not, we bring milk in here under the same inspection from other states as from Massachusetts. The bacteriological count, I am very certain Professor Jordan or anybody who knows about the subject would tell you, is as low in milk from some other states as from Massachusetts. We are keenly alive to the matter af sanitation and are sparing no pains or money to put milk into this market which is a credit to it. We are for a high standard of milk because we believe that that is what the consumers of Boston want.

If the standard is lowered we believe that very soon cows will be put into the herds that will not produce milk any higher than that standard. As somebody said at one of the hearings before the Agricultural Board last winter, the people of Massachusetts want something a little better than those of other states, and we are doing our utmost toward maintaining the very high standard which has always prevailed in this state, both for milk and other food products.

I believe, as Professor Jordan said, that there are a good many reforms to be made and new methods to be introduced. Perhaps the old milk car should be put out of commission. We are operating cars to-day that are fitted up as refrigerator cars in which the temperature can be kept at a very low point. Professor Jordan tells us that if we do not bring milk into this market of a certain temperature we are liable to annoyance and prosecution, so on this ground, if for no other reason, is it for our interest to use that car which is the best adapted for shipping milk.

I do not agree with Dr. Norris that sufficient milk can be produced within forty or fifty miles of Boston for this market. As I have stated previously before this Board, farming is being taken up by fancy farmers, by men who do not care to produce milk and who, as a matter of fact, cannot afford to put their time into this business. Such places as Lincoln and Concord are producing little milk at this time as compared with twenty-five years ago. There were at that time about four cars of milk taken from Concord, Bedford and Lexington where to-day there is practically no milk put on the cars, and I hardly think there is any more wagon milk coming in than there used to be; so I say we cannot expect to have milk produced within fifty miles of Boston in sufficient quantity to take care of this market. We are now obliged to go 150 miles from Boston for milk, and there is no more difficulty in getting it into Boston in

good condition from this distance now than there was twenty-five years ago from a distance of fifty miles.

We are heartily in sympathy with every action which your Board is making in requiring sanitary milk, and we are leaving no stone unturned to do our part in co-operating with you.

MR. RICHARDSON. If the reporters will confer with boards of health, with milk inspectors and with sanitary inspectors, they will be given facts and figures which they can publish in their public organs, the newspapers, which will be of benefit to the people, also to the boards of health, who have this question to contend with. I hope from what they have heard here that they will avail themselves of the privilege of consulting with those that know.

THE PRESIDENT. Does anything occur to you, Mrs. Richards, to add to this interesting question? You are a veteran in this matter.

MRS. RICHARDS. Mr. President, I think the education of the people is of the greatest importance, and I believe if more country laboratories, that we heard about in the first paper, were established, and more effort was made to show the public the actual reasons for these things, we should get much nearer the question. It seems to me, as I think I have said before, Mr. Chairman, that this whole sanitary matter is a question of education. The question of getting milk which is of proper quality for the children is one of the things which should be carried on in an impartial way, and I believe that the thing should come from the citizens' side as well, perhaps more readily than from the boards of health. If the boards of health in every locality would furnish the information, and then some civic association or something of that kind would scatter the right knowledge among the people by meetings, and lectures, and exhibits like the tuberculosis exhibit, or whatever we can have in that way, I think we should get *at the people*, but I do not believe we shall reach them from either side by mere general

outside discussion by people who do not understand the problem. The great question is one of sanitary importance, that is, the question of health, of saving the lives of the children and saving the health of the grown people and invalids who use the milk. We should not lose sight of that one thing, the value of human life. I suppose there is no other article of food that we consume the quality of which affects so many people as milk. I do not believe there is any article of food about the purity of which we have heard so much for the last few years, which really means so much to the community, as the milk and its cleanly quality.

DR. MILLER. Mr. President, it seems to me that, taking a sanitary point of view, we have got to pay the milk producer more. Now it costs the producer a great deal more than it did a year or two ago. I was talking only a few days since with a business man in Natick, who is dealing in this subject to quite an extent, and he said that the labor unions had interfered with his business so that he had to employ two men, or nearly two men, now to do the work of one man, consequently it cost him a great deal more. I know some men in Needham who have, for the past few years, been in the habit of buying standing grass, cutting and selling the hay. This year they have not done it, because they said they could not get the help to cut the hay. Consequently the price of hay is very much higher, the price of labor is higher, and I don't see how the producer can produce milk unless we give him a better price for it.

MR. UNDERWOOD. Might I add just a word? It seems to me that our local boards of health might do excellent work along the line that Mrs. Richards has suggested by explaining to the people some of the reasons why milk has gone up in price, one of the principal reasons being the increased cost to the producer, to enable him to deliver milk that shall come up to our sanitary requirements.

In our town, Belmont, during the past year, our Board of Health has issued a pamphlet entitled "The Production and Care of Clean Milk." This pamphlet has been sent to all our milk producers and has also been printed in our Town Report, which reaches every taxpayer in the town. It explains why it is necessary to keep the cows clean and observe care when they are being milked; to keep the stable clean and to have plenty of light and good air; and why it is necessary to cool the milk as soon as it has been milked and keep it cool until delivered.

The pamphlet also describes a number of experiments which were made by our bacteriologist, showing the common causes of bacterial contamination of milk and explaining why under some conditions the bacteria may increase enormously. All these things are told in a simple way, and we have already seen many good results from it. The milk producers are co-operating and doing all they can towards making the conditions better. It seems to me that the boards of health might do good work in this way by informing the people, as well as the milk producers, why it is necessary that so much care should be taken with our milk supply.

THE PRESIDENT. The next thing on your programme is the miscellaneous business of the Association. Is there anything which any member desires to bring forward at this time?

PROFESSOR JORDAN. Mr. President, Dr. Hanson has unfortunately been called away, and he has asked me to propose for him an amendment to the constitution. He desires the name of the Association changed from the present name to the Massachusetts Public Health Association. He has already had correspondence with a number of the members of the Association, and the greater portion have agreed that the change is desirable. I make that motion on his behalf.

THE PRESIDENT. Under the by-laws of the society the amendment will be received and acted upon at the next meeting, notice thereof being given to the members. Is there any other business?

On motion, the Association adjourned.

BIOLOGICAL LABORATORY NOTES

By FREDERIC P. GORHAM

Associate Professor of Biology, Brown University, and Bacteriologist, Providence Health Department

THE NEPHELOMETER, an instrument for the estimation of the number of bacteria in suspensions used for calculating the opsonic index and for vaccines, is described by Joseph McFarland in the Journal of the American Medical Association for Oct. 5, 1907.

A USEFUL MODIFICATION OF LOEFFLER'S BLOOD SERUM is recommended by Buchanan.* It consists of the addition of neutral red as an indicator in the proportion of 1:10,000. On this medium the meningococcus thrives well and assumes a pink color, so that the colonies may be easily detected.

PERMANENT STAINED PREPARATIONS. Those who wish to preserve stained slides of bacteria for future reference must remember that the ordinary anilin stains fade rapidly, however carefully they may be guarded from the light. The use of carbol-fuchsin, in such cases as it is applicable, will considerably prolong the life of such slides and in some cases may make them entirely permanent.

SPIROCHÆTA DENTIUM may be cultivated on horse-serum agar for several generations in symbiosis with a bacterium according to Mühlens.† The colonies show after

* Lancet, 1907, I, p. 1590.

† Central. Bakter. Erst. Ab., XXXIX, 1907, 479.

eight to ten days at 37° C. They are difficult to distinguish and appear as a yellow clouding of the serum agar. The organism may survive for four to six weeks.

NEGRI BODIES IN THE SALIVARY GLAND OF MAD DOGS. Stefanescu reports * that negri bodies may be demonstrated in frozen sections made from material fixed in formalin. They were stained twenty to thirty minutes by Mann's method (methylene blue and eosin) modified to suit the requirements of each case. The negri bodies by this method are stained red-violet, while the cytoplasm of the cells is blue.

GRANULAR FORMS OF THE DIPHTHERIA BACILLUS. In the routine examinations for the diagnosis of diphtheria in our own laboratory, and Mr. Rickards informs us that the same is true in the Boston Laboratory, the granular forms of the diphtheria bacillus have been exceptionally uncommon this fall. Their place is taken by the barred type, which have become now the most common form. Indeed there would hardly be a positive diagnosis at present were we to abide by the former rule to regard the granular types alone positive.

STAINING SPIRILLA IN SPUTUM. Follet recommends † the use of the following method for staining the spirilla ordinarily found in sputum. With a platinum needle select a small bit of freshly expectorated sputum, preferably after fasting, place on a slide and add thereto a minute drop of the following stain, mix thoroughly, put on a cover-glass and examine. Stain: glycerin, 40 gm.; acid fuchsin, 2 gm.; pure carbolic acid, 0.5 gm.; mix and filter. Double staining may be effected by using in addition to the acid fuchsin

* C. R. Soc. Biol., LXVII, 1907, 886.
† C. R. Soc. Biol., LXII, 1907, 567.

solution the following: glycerin, 40 gm.; methylene blue, 2 gm.; pure carbolic acid, 0.5 gm. This method stains all the spirilla of the mouth and there is no difficulty in recognizing the Treponema pallidum if it be present. Another method suitable for both fixed and fresh films consists in staining in the following: chloroform, 40 gm.; methylene blue, 2 gm.; acid fuchsin, 0.25 gm.; pure carbolic acid, 0.5 gm. The stained preparations must be thoroughly washed in running water and if need be in alcohol to remove the excess of stain.

SYNTHETIC CULTURE MEDIA. The increasing use of synthetic culture media indicates that the time is not far distant when we may hope to secure more definite knowledge of the food requirements and other points in the biochemistry of micro-organisms. We note the paper by Hadley* on "The Growth and Toxin Production of Bacillus Diphtheriæ upon Proteid-free Media," in which he found that the diphtheria bacillus would grow and produce its toxin upon the following:

Glycerin	3.40	parts
Sodium chloride	0.60	"
Calcium chloride	0.08	"
Magnesium sulphate	0.32	"
Di-potassium phosphate . .	0.23	"
Ammonium lactate	0.75	"
Glycocol	0.10	"
Distilled water to make . .	100.00	"

In our own laboratory it has been found that the colon bacillus will grow abundantly and quickly on the following:

Sodium or ammonium phosphate,	0.20	parts
Asparagin	1.00	"
Distilled water to make	100.00	"

* Jour. Inf. Dis., 1907, Suppl. No. 3, page 95.

In some cases ammonium lactate may be substituted for the asparagin.

Taltavall and Gies,* in "A Chemical Study of a Bacillus Causing Septicæmia in the Rabbit," made use of the following:

Di-potassium phosphate	0.20 parts
Potassium aspartate	0.40 "
Potassium lactate	0.60 "
Distilled water to make	100.00 "

Jordan, in "Experiments with Bacterial Enzymes,"† found that a large amount of gelatinase is formed by some bacteria in non-proteid media. In asparagin, 0.2 parts; sodium phosphate, 0.2; distilled water, 100.0 parts, *B. subtilis* grows well and produces gelatinase slowly. The addition of magnesium sulphate gave very similar results, but the substitution of a potassium for a sodium salt led to a negative result.

* N. Y. Med. Jour., LXXXVI, 1907, 723.

† Biological Studies by the pupils of William Thompson Sedgwick.

CHEMICAL LABORATORY NOTES

By FRANKLIN C. ROBINSON
Professor of Chemistry, Bowdoin College, Brunswick, Me.

FORMIC ACID AS A PRESERVATIVE. Formic acid has long been known to be a powerful antiseptic, and now it appears on the market for that purpose under the names of werderol, fructol, alaced, extract of nettles. It is especially used to preserve fruit juices; 1–1.3 grams of formic acid per 1,000 is sufficient for such preservation, and the above preparations contain from 11–50 per cent of the acid. It can be detected by diluting the fluid, acidifying with hydrochloric acid and distilling with current of steam, receiving the distillate in a solution of sodium hydrate, a weak solution. The distillate is evaporated to 10 c.c., treated with barium hydrate, filtered, the excess of barium removed by sulphuric acid, and the filtrate from this treated with mercuric chloride. Formic acid is shown by a precipitate given by the mercuric chloride.

TEST FOR ACETANILIDE IN HEADACHE POWDERS. Heat the substance for some minutes with moderately strong hydrochloric acid and, if acetanilide is present, aniline will be formed, and can be recognized by its odor, and by giving the precipitate with bromine water or sodium bromate. The test can be made quantitative by weighing the powder, and then after liberating the aniline, titrating with a hot solution of potassium bromate. The end point is a permanent yellow color.

ACTION OF BILE ON PNEUMOCOCCUS AND STREPTOCOCCUS MUCOSUS. Recent tests show that they are

destroyed by bile and also by the pure sodium taurocholate obtained from bile, but that other streptococci are not acted upon.

SUBLAMIN. This is a compound of mercuric sulphate and ethylendiamine. It is proposed as a substitute for bichloride of mercury; the superior claim for it is that it is not precipitated by albumin. Tests show that it is not less poisonous than the bichloride.

DRY POWDER FIRE EXTINGUISHERS. Most, if not all, of these are bicarbonates, generally of sodium, and what efficiency they have is supposed to come from the carbon dioxide which they give off when heated. As a matter of fact a fire has to be pretty well along before it is hot enough to decompose enough sodium bicarbonate to be of much value as an extinguisher, and on a small fire they merely act mechanically, like any other inert non-inflammable substance, fine sand, for example.

ILLUMINATING GAS VS. ELECTRICITY. Mr. Vivian Lewis, writing in the *Progessive Age*, makes the claim, which is rather novel, that gas is superior to electricity for room lighting from a hygienic standpoint. He says that it is a fact that in a hall lighted by electricity an audience cannot remain in comfort for even an hour, while when it was lighted by gas they stayed in it for three hours without complaint. The explanation he offers is that, although gas flames add carbonic acid to the room, yet they burn up the organic matter given off in the breath, and this, and not carbonic acid, is the discomforting thing in such a room. His experiments seem to bear out his theory. Gas flames are also a help to the proper acting of all automatic systems of ventilation, while electric lights have little or no influence of that kind.

PERSONAL HYGIENE

By PERCY G. STILES, Ph.D.
Instructor in Physiology, Massachusetts Institute of Technology

BACTERIA OF THE INTESTINE. This is a subject which is constantly assuming greater importance for the student of personal hygiene. A notable book of the year is Dr. C. A. Herter's "Bacterial Infections of the Digestive Tract." The reader is at once impressed by the great number of recent studies in this field and by the growing recognition of the putrefactive organisms in the colon as a cause of many systemic disturbances. It has, of course, long been plain that mild symptons of toxæmia may result from undue bacterial action in the alimentary canal—such, for example, as headeache, drowsiness, and generial inertia. But it appears constantly more probable that other and more acute troubles may have a similar origin. Under this head may be included many cases of dyspepsia, rheumatism, anæmia and nervous disorders. The offending organisms are generally of an anaerobic type and the species and characters observed are fully dealt with by Dr. Herter. The conditions found in the small intestine rarely favor their growth, but too often they thrive in the colon.

Our present interest is in the means available for the restraint of these harmful bacteria. Metchnikoff and others have for some time advocated the practice of introducing large numbers of acid-producing organisms with thc food, seeking thus to make the dominant type of bacterial action

in the intestine one which is inimical to the growth of putrefactive anaerobes. This has been variously accomplished, by the drinking of milk soured by pure cultures of acid-formers, by the more palatable modifications known as kephir and koumyss, and also by taking the organisms in tablet form (lactobacilline). The success of these methods has often been striking and is registered at the same time by the improvement in the patient's general condition and by the nearly complete disappearance from the urine of the telltale indican. The bacteria of the colon group are conceived to be in some degree defensive against the anaerobes.

If the putrefactive organisms are not to be kept in subjection by hostile forms, the alternative is to limit their food supply, and it is here that Dr. Herter's suggestions are most practical. To keep down the proteid residues in the large intestine it is obviously necessary to avoid overfeeding. In particular it is well to use little meat or milk. Gelatine may be substituted to some extent for proteid, as this albuminoid yields no aromatic decomposition products, and cannot give rise to indol or related bodies. Having made sure of a reasonable diet, the next object is to promote digestion and absorption in every possible way. A vicious cycle is very likely to be encountered, since intestinal putrefaction lowers the efficiency of the digestive apparatus, and the disordered digestion in turn leaves more material subject to putrefaction. Dr. Herter recognizes the great value of rest in restoring the impaired digestive power. Avoidance of fatigue and freedom from worry are probably more effective than the employment of pepsin preparations or intestinal antiseptics. The author does not recommend the extensive use of drugs of the latter class, holding that they must usually be toxic to the tissues as well as to the bacteria. Hydrochloric acid he thinks to be occasionally beneficial. Something may be accomplished by thorough washing out of the colon.

One is led to realize afresh how nearly useless the large intestine has come to be in the case of civilized man. Once a necessary organ of some ancestral creature, it is now a drawback and a menace to health. Metchnikoff has claimed that the poisons absorbed from this superfluous bowel bring on arterial sclerosis and hasten the advance of old age. The present work emphasizes similar possibilities for mischief. Dr. Herter believes that in cases of obstinate putrefactive activity with serious general effects it may be necessary to shorten the large intestine by a surgical operation. Loss of the whole colon, with the establishment of an opening near the end of the small intestine, has been more than once recorded. There was no failure of nutrition in such cases, but a complete suspension of putrefactive processes with inoffensive acid discharges. It is fair to add that Fletcher and some of his disciples appear to have secured a similar immunity from putrefaction by the well-known methods of the cult — a minimal diet well masticated.

MUNICIPAL SANITATION

CHARLES V. CHAPIN, M.D.
Superintendent of Health, Providence, R.I.

CONTROL OF MEASLES. Dr. Aberstaller * of Graz, a city of 175,000 inhabitants in Styria, does not believe in very stringent measures for the isolation of this disease, but he thinks that much may be accomplished by procedures which do not inflict very much hardship on any one. His chief attention is directed to school attendance. When measles develops in a family the well children are excluded from school unless they have previously had measles. The evidence of a previous attack is obtained from the records of the health department. This may be satisfactory in Graz, but with the defective registration of measles and with our shifting population the records in American cities are very incomplete. In Providence children who have had measles are allowed to go to school, and thus far I have found that it is in most instances possible to rely upon the statements of the family or of the attending physician as regards previous attacks. The Styrian Board of Health recommends that all children over twelve years of age, in measles families, be allowed in school, irrespective of whether they have had the disease. This is on the theory that nearly all children of that age are for one reason or another immune. Personally I am inclined to think that this position is well taken, but Aberstaller does not approve of it.

Most sanitary authorities close schools on account of measles only when a considerable number of cases have

* Public Health, August, 1907, page 691.

appeared. Quite a different procedure is followed in Graz. When a case of measles occurs in a school nothing is done for eight days, at about which time it is believed that any children who contracted the disease from the first case are likely to begin to show symptoms. The school is then closed and kept closed for about ten days, when it is assumed that all cases contracted from the initial case will have developed. Of course, all secondary cases are isolated at home, and the school is then opened for the other children. Dr. Aberstaller records 103 outbreaks during the last eight years treated in this way. In ninty-one instances only one class was closed, which I presume corresponds to the closure of a single room in an American school. "Of these prophylactic school closures, forty-four were attended by complete success, *i.e.*, absolute and lasting freedom from measles after reopening. In ten cases no secondary infection occurred during the closure, which may therefore be termed superfluous, while in twenty-eight cases the procedure had no apparent success, inasmuch as further cases resulted immediately afterwards. In the remaining twenty-one cases the result remained in doubt, as these classes were again attacked a little later by the epidemic which had meanwhile increased outside of the school."

Attention has previously been called in this Journal to the fact that the Department of Health of the City of New York in 1902 adopted very stringent regulations for the control of measles, insisting upon the isolation of the patient, rigid school exclusion and disinfection. Below are given the cases and deaths reported since 1898. As may be seen, there has been some decrease in the number of deaths, and an apparent great increase in the number of cases. This increase in cases is very likely due to better registration. Whether the decrease in deaths is due to restriction of the diseasc, that is, is a real decrease in the number of cases, or to a change in the character of the disease, or to a change

in the age distribution of the cases, it is impossible to tell from the report.

Year	Cases	Deaths
1898	9,916	651
1899	8,577	587
1900	10,698	816
1901	7,592	449
1902	11,645	710
1903	13,689	508
1904	32,861	895
1905	19,026	247

RESPONSIBILITY FOR THE REPORT OF BIRTHS. The Appellate Division of the Supreme Court of New York * rendered a decision May 13, 1904, in an action brought by the Department of Health against William W. Owen, that it was not sufficient for a physician to mail the return of a birth, but he must see to it that it was actually received by the Board of Health. From the fact that the Court stated that the physician may readily ascertain, by telephone, whether the return had been received, it would appear that it would be within the law to report the birth by telephone.

Since 1893 the Department of Health of the City of New York has acknowledged all reports of contagious disease, so that if a physician does not receive such acknowledgment he knows that his report has not reached the department.

TO STOP SPITTING IN CARS.† In Minneapolis whenever a person spits on the floor of a car the conductor is to give the spitter a red card on which is printed the ordinance. This somewhat conspicuous procedure is said to have had a marked deterrent effect.

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* 94 App. Div., 425.

† Report of Department of Health of Minneapolis, 1906, page 15.

PREVENTION OF INFANT MORTALITY. In order to prevent infant mortality by offering advice, furnishing a nurse, or supplying pure milk, it is highly important to begin early, hence it is desirable that every birth should be brought to the knowledge of the health officer as soon as possible. Very few laws require the immediate report of a birth, hence Dr. Pringle, the Medical Officer of Health of Ipswich, England,* offers one shilling to *any* person who first reports a birth within forty-eight hours.

VALUE OF REMOVAL TO THE HOSPITAL. It is a custom to attribute to contagious disease hospitals a high degree of utility in protecting the remaining members of the family by affording a suitable place to which the patient may be removed. It is very desirable to know exactly how much removal to the hospital really accomplishes in the way of affording such protection. Very few reliable data are available. Dr. Malet, of Wolverhampton, England,† states that of 7,766 susceptible children under eighteen years of age remaining in houses after removal of scarlet-fever patients to the hospital, 372, or 4.8 per cent, were subsequently attacked, while of 721 children in scarlet-fever families, where the patient did not go to the hospital, 179, or 24.8 per cent, were attacked subsequent to the first case. According to these figures the chance of other children in the family becoming infected when a case of scarlet fever is treated at home is nearly five times as great as when the initial case is removed to the hospital. It is highly desirable to have figures from other places, and to consider them with reference to the age distribution of the children, and the date of removal to the hospital.

* Public Health, September, 1907, page 741.
† Public Health, September, 1907, page 753.

SANITARY ENGINEERING NOTES

By ROBERT SPURR WESTON, Boston, Mass.
Assoc. M. Am. Soc. C. E.

EFFECT OF COPPER ON WATER BACTERIA.* The author's experiments show that harmless bacteria in water supplies are not appreciably affected by certain small doses of copper sulphate sufficient to kill the harmful kinds of bacteria. They further state that carbon dioxide lessens the destroying power of copper sulphate, but that it has no effect upon the bacteriacidal action of metallic copper.

The authors fail to state what the effect would be upon the other plant and animal life to which bacteriacidal doses of copper were added. Others' experience goes to show that fish are killed when copper is added to water in large doses.

The authors mention the use of copper sulphate in connection with water purification, and advise that in mechanical filtration of hard waters copper sulphate be added some hours before coagulation, since after the addition of sulphate of alumina a hydrate of copper and aluminum appears, which precipitates as under direct bacteriacidal action.

The authors state that where copper sulphate and iron sulphate are used together in the purification of water, the copper retains its toxic properties. The latter diminish, however, in the presence of carbon dioxide. When copper salts are used in connection with slow filtration plants they should be added to the effluent, otherwise the toxic effect is lessened.

* Kellerman and Beckwith, U.S. Bureau of Plant Industry, Bulletin No. 100, Part VII.

THE RECOVERY OF ALBUMINOID AMMONIA FROM DISTILLATES CONTAMINATED WITH PERMANGANATE.* Because the albuminoid ammonia test in water is often rendered useless as a result of alkaline permanganate going over into the distillate, Hale has suggested a method for its recovery, to be used only when a second portion of water is not available. In brief it is this. Reduce the permanganate by an alkaline sulphite solution, oxidize the manganous salt to the hydrated peroxide, filter off the manganese on a carefully washed filter paper, nesslerize the filtrate, and read in the usual manner.

CHICAGO DRAINAGE CANAL CASE.† A discussion of this famous case, in which the United States Supreme Court decided that the state of Missouri proved that St. Louis had not suffered because of the opening of the Chicago drainage canal. The discussion held at the meeting where numbers of experts from both sides took part is interesting but too long to abstract. It contains the latest ideas of the best experts on the pollution and self-purification of streams.

NEW SETTLING BASINS AT ST. LOUIS.‡ The present subsiding basins at St. Louis have been increased by two new basins each 400 feet wide by 800 feet long, and having an average depth of about 21 feet. In addition to the basins a new building for storage and application of the chemicals used as coagulant is being constructed.

SEWAGE DISPOSAL BY BIOLOGICAL PROCESSES.§ The author gives results based on his extended experience at Birmingham, England. "No matter by what method the tank is prepared for oxidation and nitrification on a

* F. E. Hale, Journal of American Chemical Society, XXIX, page 1085.
† Journal of American Water Works Association, 1906, pages 153–248.
‡ Engineering Record, 56, 13.
§ A. D. Watson, Engineering News, 58, 89; also Engineering Record, 59, 91.

biological filter, it is desirable that it should be rendered as free from suspended matter as possible." For this purpose the author employs special pyramidal tank with vertical walls rising in the form of a square. The velocity of the sewage entering the tank is from one to two feet a second. The average velocity in the tank is seven feet an hour. The sludge is drawn off from time to time from the apex of the pyramidal bottom. The cost of tank treatment is about forty cents a million gallons. The cost of burying sludge from the tank is about fifteen cents per million gallons. The cost of installation is about $2,530 per acre of bed supplied.

Biological filters should be on the percolating principle. The material should be supported on special tile underdrains in order to allow the free exit of all matter in suspension and to afford ample aeration. Any rough material will do for filtering, but it should be durable and the particles should approach a cubical shape to prevent their surfaces coming into too close contact. The smaller the particles the better the effluent, but perfect effluents should not be striven for, and a non-putrescible effluent is to be desired. The effluent should contain nearly as much suspended matter as the applied sewage. The distribution of sewage over the filter is most important. Conditions approaching falling rain are ideal. Better distribution effected by movable distributors is not worth the increased cost over fixed sprays, and the difference in efficiency is hardly noticeable. The suspended solids in percolating filter effluents amounted to from 70 to 80 parts per million and were removed by subsidence, at a cost of ten cents a million gallons. The article is accompanied by valuable tables showing in a very condensed form the results of operation of eleven experimental beds together with valuable cost data. Author advises caution in estimating the capacity of trickling filters. Beds six feet deep at Birmingham handle about 900,000 gallons of strong sewage per acre per diem with occasional doubling of the

rate for very short periods. The paper is commendable for the condensation of much valuable and practical information in small space.

OFFICIAL REPORT ON TYPHOID FEVER IN WASHINGTON, D.C., IN 1906.* This report was made by the officers of the United States Public Health and Marine Hospital service, and is the most comprehensive report ever made. The report followed an epidemic, which in turn followed the installation of new water filters at Washington. The commission debits ten per cent of the typhoid cases to the milk supply, fifteen per cent to importations, and six per cent to contact, leaving sixty-nine per cent unaccounted for. The disease reaches its height early in August. It is the impression of the members of the Board that fruit and vegetables, also shellfish and fresh-water fish had nothing to do with the epidemic. Bedside disinfection was found to be insufficient in the majority of cases. The milk supply is in a deplorable condition. Intestinal worms were not found in any of the two hundred cases selected at random for investigation. All the deep wells examined were of excellent quality, but about one-half of the shallow wells showed evidences of pollution, yet none of the cases of typhoid investigated were attributed to polluted well water. Much of the table water sold in Washington is suspicious. The water supply is from the Potomac River. Practically no direct pollution takes place within nineteen miles of the intake. The sewage of about 45,000 people drains into the river, indirectly for the most part. The dilution therefore is very great. Filters were installed in 1905 to treat the water after storage for about four and one-half days in the system of reservoirs constructed some years ago. Bacterial examination shows these filters to be sufficient, although B. coli was found in 66.6 per cent of the raw water samples and in

* Engineering News, 58, 44.

14.2 per cent of the filtered samples. It should be noted that the filters were designed to operate with the aid of a coagulant, but that the opposition of the public, the Medical Society in particular, has prevented the carrying out of the original plans. The article states the points in favor and against the view that the Potomac River plays an important part in the dissemination of typhoid fever in Washington, but the commission is unable to give a definite answer to this question. Neither is it able to show that the water is an important cause of the typhoid. Typhoid fever in Washington is mainly a summer disease, and is especially prevalent among the colored population. Mention is made of the fact that Winnipeg, with the artesian well supply of exceptional purity, has a death rate of more than double that of Washington, but the report failed to state that the epidemics at Winnipeg had been caused by the taking of unpurified river water into the mains during shortages in the well-water supply. Typhoid fever death rate of Washington as compared with other southern cities and from an epidemiological standpoint may be placed in their class. For example, the death rate at Memphis, which has an exceptionally pure water supply from artesian wells, is 45.22, while Washington has a death rate of 49.30. The commission reserves its final decision on the part played by the Potomac River water in the spread of the disease, but is very emphatic in stating that the successful control of the disease lies in the destroying of the infection as it leaves the body. It also is of the opinion that the disease is prosodemic, that is, due to constant and general unhygienic conditions.

COMPARATIVE DISPOSITION OF ORGANIC MATTER BY SAND, CONTACT AND SPRINKLING FILTERS.* A general and comparative article on the operation of these

* H. W. Clark, Engineering News, 57, 607.

three types of sewage filters, accompanied by careful summaries based upon the work and present condition of sand filters that have been operated nineteen years, contact filters that have been operated six years and sprinkling filters that have been operated nearly eight years, each and all receiving Lawrence (Mass.) sewage. From 50 per cent to 75 per cent of the matter in suspension in sewage is organic, and less than 8 per cent of this is nitrogen, the rest is carbonaceous matter. The total organic matter in the sewage at Lawrence has amounted on the average to 2,800 pounds per million gallons, and the suspended matter to 2,080 pounds. The suspended matter composed of 70 per cent organic or volatile matter and 30 per cent human matter. Of the organic matter 2.6 per cent has been organic nitrogen. The remainder has been carbonaceous containing 40 per cent of carbon and 22 per cent of fatty matters. Typical results of operation are given which cannot be reproduced, but which are well worth reading. Each filter performs a different office. Each sand filter produces a practically odorless and highly nitrified effluent. The rate of filtration, however, can rarely exceed 100,000 gallons per acre when receiving strong sewage. Contact filters allow rates six to eight times as great as sand filters, but only the best give non-putrescible effluents. Trickling filters can be operated with normal sewage at rates at least three or four times as great as contact filters and twenty times as great as sand filters. They produce a highly nitrified, practically odorless and non-putrescible effluent, which, however, contains considerable suspended matter which must be removed in many cases. The organic matter which is applied to the filters with the sewage is of two kinds, stable and unstable. This matter accumulates to a greater or less degree in all filters, but most of all in the sand filter and least in the trickling filter. The accumulation in the sand filter has to be removed by scraping, while in the trickling filter it is dislodged from the filter-

ing material and passes through with the effluent in large quantities. Contact filters are very apt to accumulate organic matter, but there is some chance that part of it will be oxidized, especially that part which putrefies in the filter. The article bristles with facts and the conclusions are based upon many years' experience in each case.

WATER PURIFICATION AT ST. LOUIS.* Author gives results of operation of coagulating basins at Chain-of-Rocks, where are treated a daily average of 70,000,000 gallons of good water having a turbidity of over 1,200, a color of over 40 and an alkalinity of over 135 parts per million. Ferrous sulphate is added to the water, then milk of lime, and the water is clarified in six subsiding basins. Four new basins are being added. The amount of the constituents of the water fluctuates continually. An increase of 2,000 parts of suspended matter a million within twenty-four hours is not uncommon. The process removes about 99 per cent of bacteria and reduces the turbidity to less than ten parts per million. The process also removes about 75 per cent color, 54 per cent calcium and 57 per cent magnesium. Two and thirteen-hundredths grains of ferrous sulphate and 7.39 grains of lime per gallon are required on the average. The cost of chemicals is $3.986; of labor, $0.579; of power, $0.064; for repairs, $0.063; for improvements, $0.021: a total of $4.623 a million gallons. Two per cent of the water pumped is used in cleaning the basins. A special method of slaking lime continuously in which the water used is raised 60° or 70° F. above its initial temperature by the heat developed during the slaking process has been devised by the author. The milk of lime contains one pound of lime in from three and one-half to three and three-fourths pounds of water. The residue in the slaking tanks is less than one per cent of the lime used.

* W. F. Montfort, Engineering Record, 56, 98.

TIME OF PASSAGE OF LIQUID THROUGH PERCOLATING BEDS.* The usual method of determining this has been the noting of the time between the pouring of some colored liquid on the bed and the first appearance of color at the outlet, no account being taken of the solution or its distribution over the surface. Salt solution can take the place of color to advantage in this. The average time of passing of the whole solution through the bed at any point can be recorded.

THE INTERACTION OF DILUTE SOLUTIONS OF AMMONIUM SALTS AND VARIOUS FILTERING MEDIA.† From the treatment of different media with ammonium chloride, the following conclusions have been deduced:

A. In the majority of cases appreciable absorption did take place.

B. In almost all cases the action was completed after twenty-four hours' contact.

C. The act was confined to the liquid in intimate contact with the solid.

D. Presence of supernatant liquid tending to reduce the apparent proportion of ammonium removed from solution.

E. When absorption took place solution of certain of the constituents used as media, for example, iron, calcium, etc., was effected.

F. The acid radicle of the ammonium salts was not absorbed.

Other interesting results are noted, among them that the action is due to physical structure and chemical composition, not to a biological agent; that ammonium is not removed by volatilization or oxidation, and that temperature does not affect the action. Discussion is given to the part absorption

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* William Clifford, J. Soc. Chem. Ind., 26, 13.

† G. J. Fowler and P. Gaunt, J. Soc. Chem. Ind., 26, 13.

plays in nitrification. On the whole the paper is a record of careful and thorough experiments, proving some points as well as giving good suggestions for future work.

THE RELATIVE MERITS OF CHEMICALLY TREATED, SETTLED AND SEPTIC SEWAGE IN PREPARING THE LIQUID FOR OXIDIZING BEDS.* The author has recorded his nine years' experience with the sewage of Leeds, England. "The effect of chemical precipitation, simple sedimentation and septic settlement has each been investigated, and it is now intended to describe the general nature of the sewage treated, to state the facts observed in connection with each tank process, to show the connection between the respective tank effluents and the filtrates obtained from the oxidizing beds." The sewage of Leeds is not strong, but its treatment is complicated by the presence of trade wastes. The textile trades are responsible for 13 per cent of the total flow of sewage, tanneries and breweries jointly contribute 5 per cent, oil, soap and tallow works 2 per cent, chemical works 1 per cent. The dry-weather daily flow contains 5 grains of iron per gallon. Normally the combined sewage is neutral.

Various chemical precipitants were tried and a combination of 6 to 8 grains of lime and 2 grains of sulphate of alumina per gallon proved most economical. This with a twelve-hour period of sedimentation.

A period of twelve hours' plain subsidence reduced the suspended solids to about 8 grains per gallon.

The results with septic tanks show no preference for either open or covered tanks. Various periods of storage were tried. Forty-two liters of gas were evolved from 100 gallons of sewage. At a twenty-four hours' rate of flow in a period of twelve months, about 30 per cent of the suspended solids was digested in the tanks, 31 per cent passed out of the tank

*George Adam Hart, Eng. News, 84, 36.

in the effluent, and the balance of 39 per cent remained in deposit. Comparative chemical analyses of the different effluents are given, also the effluents from oxidizing beds treated with the various tank effluents. The oxygen absorbed in the four hours at 80° F. by the various effluents was as follows: crude sewage, 8.25, precipitated sewage, 2.72, settled sewage, 3.57, septic effluent, 4.25 grains per gallon. The oxygen absorbed by the effluent from the oxidizing bed treating precipitated sewage was 0.56, treating settled sewage, 0.83, treating septic effluent, 1.12 grains per gallon. The solids in suspension were as follows: crude sewage, 51.3, precipitated sewage, 4.8, settled sewage, 9.7, septic sewage, 12.5 grains per gallon. The rates of filtration were as follows, expressed as gallons per cubic yard for twenty-four hours: treating precipitated sewage, 100 gallons, treating settled sewage, 63 gallons, treating septic sewage, 63 gallons per cubic yard. The lower the relative value of the oxygen absorbed figures, the less will be the degree of oxidation to produce a non-putrescent result. A comparison of the relative suspended solid values is very instructive. For the other results the reader is referred to the original article.

USE AND ABUSE OF SEWAGE PURIFICATION PLANTS.* The author has given a discussion of the subject from the standpoint of practical results, with these questions in mind, namely, whether rivers and bodies of water have been protected by the use of sewage disposal plants, and if not, what are the causes underlying their failure to accomplish the desired ends. He describes various types of sewage disposal plants in use, taking examples from those in use in Ohio. He discusses the efficiency of these plants in detail and emphasizes especially the necessity of careful supervision of such works in order to solve the problems of operation which are fully as serious as those of construction.

* A. Elliott Kimberley, Eng. News, 58, 235.

SULPHATE OF IRON AND CAUSTIC LIME AS COAGULANTS IN WATER PURIFICATION.† The use of sulphate of alumina as a coagulant in water purification is quite generally understood, also the use of caustic lime as a reagent for water softening. Furthermore, lime and sulphate of iron in combination have been used to precipitate sewage for many years. Of late years this combination of chemicals, used originally for sewage precipitation, has been adapted to water purification. The causes of this development have been the popular prejudice against the use of alum, the low price of sulphate of iron (a by-product of the manufacture of steel) and lime, and the softening action of the lime when added to water containing calcium and magnesium bicarbonates. The adaptation of this latter process has not been an easy task, because of certain physical and chemical difficulties. The reaction is not so speedy as that with sulphate of alumina, although when the calcium is once precipitated it acts much faster than does aluminum hydrate, which is the result of the addition of alum or sulphate of alumina to water.

To begin with, the iron hydrate, which is the active coagulating agent, is precipitated in the soluble ferrous or unoxidized form and slowly oxidized to the insoluble ferric form. The coagulant must be oxidized or it will not be removed in the purification process. The main retarding agent is carbonic acid. To remove this lime is added, in excess not only of the carbonic acid but of the calcium and magnesium bicarbonates also. This addition also softens a water and, where magnesium is present, throws down magnesium hydrate, which also acts as a coagulant.

The process is particularly adapted to turbid waters containing calcium and magnesium bicarbonates. Soft waters and those containing dissolved color have not yet

† J. W. Ells, Paper read before Central Water Works Association, 1906. Also Engineering Record, 1906, page 439.

been successfully treated by this process, probably because of lack of scientific experience rather than because the process cannot be applied. The waters of the Southern seaboard are also difficult to treat, probably because of the small amount of magnesia contained in them. Experience has shown that the precipitate of calcium carbonate formed by the addition of lime to water crystallizes and settles very slowly.

In any case the process mut be controlled by a competent chemist and ample means must be employed to effect precipitation of the carbonates, lest "after deposits" be formed in filters and distribution systems. The sedimentation of turbid waters treated by this process is very rapid, because of the relatively high specific gravity of the iron hydrate (ferric hydrate). It eliminates the necessity of preliminary sedimentation often necessary where sulphate of alumina is used. Smaller coagulating basins may be used and sudden fluctuations in turbidity may be treated successfully without excessive amounts of chemicals. Most of the work of purification is therefore done in the coagulating basin, thereby relieving the filters and increasing their net capacity, as they do not require washing so frequently.

The decreased cost of the treatment is a great advantage; especially is this true where the amounts of suspended matter are large. In some cases the cost may be only one-half of the cost of sulphate of alumina. The process is already in use in several cities (St. Louis, Mo., Ashland, Ky., and others), and is to be adopted in Columbus, O., Cincinnati, O., and New Orleans, La.

THE HEALTH OF EMPLOYEES IN THE NEW YORK SUBWAY.† An article describing the general good gaseous character of the air in the New York subway, also the iron dust prevalent and the diseases, especially dry pleurisy,

† George A. Soper, Technology Quarterly, XX, 218–245.

existing among the employees, followed by recommendations for examination of the men, for preventing dust as far as practicable from entering the air and the careful removal of the same, and especially to have strict enforcement of the law against spitting in view of the longevity of some germs in the subway atmosphere.

THE DETERMINATION OF ORGANIC NITROGEN IN SEWAGE BY THE KJELDHAL PROCESS.* In this study on the direct nesslerization of Kjeldhal digestates, no special treatment for the removal of calcium is thought necessary unless the amount exceeds fifty times the nitrogen content, because calcium is seldom the cause of turbidity. Magnesium, on the other hand, even in small amounts, does interfere with the reading, and, therefore, has to be precipitated by an excess of sodium hydrate, which at the same time removes any other deleterious constitutent if such exists. In this method, as immediate filtration takes the place of the long period of settling in the previous determinations, much time is saved, with results fully as accurate as by distillation.

EXAMINATION OF WATER PURIFICATION PLANT AT OWENSBORO, KY.† A description of the new infiltration plant consisting of the 576 lineal feet of Cook well point strainers with suitable connections laid in a sand bar opposite the pumping station. The plant furnishes about 1,500,000 gallons of clear, satisfactory water per diem at no greater expense than would be incurred by the pumping of untreated river water. At the time of the examination the supply was in every way satisfactory, although it is apparent that in the future growths of Crenothrix will cause odors and tastes and a deposition of iron in the drains. The

* Leyland Whipple, Technology Quarterly, XX, 162–169.
† Philip Burgess, Eng. Rec., 56, 340.

author found no B. coli in the effluent, while the Ohio River water is considerably polluted.

WORK AT MADELEINE SEWAGE EXPERIMENT STATION, FRANCE.* A sewage experiment station has been established near Lille under the direction of the Pasteur Institute of that place, for the purpose of indicating to the authorities and private interests most practical methods of disposing their wastes, with the hope that the gross pollution of the streams in the north of France may be diminished. The station was capable of handling 500 cubic meters in twenty-four hours. The devices experimented with were septic tanks, single and double contact filters and trickling filters. The rates of operation were rather variable, but on the average were those which have been experimented with elsewhere. Results show that the removal of the suspended matter by the tanks was exceptionally good. No appreciable advantage was found in the covered septic tank over the open one. The trickling filter gave very much better results than the contact filters. The material in the trickling filter was fine slag (the run of the crusher), and the good results may have been due to the fineness of this material. The surface had to be raked occasionally to keep it porous. It acted more as a well-drained intermittent filter operating at a rate of from 500,000 to 1,000,000 gallons per diem.

WATER PURIFICATION PLANT AT EXETER, N.H.† A description of the new water filter constructed for the supply of the town of Exeter, N.H. The water supply is from an impounded reservoir occasionally contaminated with clay and organisms. The purification plant consists of coagulating basin and two mechanical filters, all constructed of concrete, and having a capacity of one million gallons per diem.

* Earle B. Phelps, Eng. News, 58, 162.
† Robert Spurr Weston, Eng. News, 58, 136.

SEWAGE EXPERIMENTS AT MATUNGA, BOMBAY.* The author describes his visit to the sewage experiment station at the Leper Colony at Matunga, near Bombay, where for nine years valuable experiments have been carried on by Mr. C. C. James, C.E. Experiments have been made with the septic tank and various types of filters, including contact beds and trickling filters. The septic tank is much more efficient than in a cold climate, and the results are the antitheses of those obtained with the domestic sewage from the Czar's palace near St. Petersburg. At Matunga the effluent was nearly free from visible solids, and the deposit in the tank need only partially to be removed at the end of three years. The temperature of the sewage varies from 78° to 90° F. Unusual quantities of gas, estimated at from 3 to 4 cubic feet per head of pollution per day, are given off, and the tank effluent is used to irrigate crops which are grown at a net profit of 45 per cent on the investment. The tank effluents in India may be filtered at a very high rate, as much as two million gallons per day being applied to trickling filters using rotary sprinklers. The contact beds have given good results with very little sign of clogging. Very good results also have been obtained by the direct application of sewage to a Ducat filter. The gas from the septic tank is used to drive a gas engine. The conditions which govern the production of gas, the studies of its composition, and the means taken to produce a gas with a minimum of nitrogen and a maximum of combustible gas are fully discussed in the text.

MAINTENANCE OF SMALL WORKS FOR TREATING SEWAGE AND WATER.† The writer notes that small water purification and sewage disposal plants fail more

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* Gilbert J. Fowler, Eng. News, 58, 146.

† Editorial, Eng. Rec., 56, 332.

often because of faults of operation than because of faults of design, as it is impossible to design small plants which are "fool proof." It behooves engineers designing these small plants to urge their clients in some cases to provide for their adequate supervision by their designer, at least during the first years of operation.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. SLACK, M.D.
Assistant Director Boston Board of Health Laboratory

EXCLUSION OF MILK FROM TUBERCULOUS CATTLE — MONTCLAIR, N.J. A recent copy of the Sanitary Code of the Board of Health of Montclair, N.J., is of especial interest on account of the regulations concerning milk and its production, which are worthy of being taken as a model by any community desiring a pure milk supply.

Montclair has long stood in the front rank in this regard, and the latest requirement that all cows supplying milk to the town shall be proven free from tuberculosis by the tuberculin test is in line with the progressive policy of her Board of Health.

A letter issued by the Board to the Montclair public closes with this statement:

"In conclusion perhaps we should make more clear than has yet been done the object of the tuberculin test, and of the exclusion of all tuberculous cows from herds supplying milk for Montclair. The object is to contribute to the reduction of the high mortality from tuberculosis (consumption) which prevails in Montclair as elsewhere, and which in our town caused 12.2 per cent of all deaths during 1906. This disease, it is now generally accepted, may be communicated from cows to man through the milk of tuberculous cattle."

In a study of this subject from the standpoint of the producer it is a serious question, aside from a consideration of the ethics of marketing milk from tuberculous cattle,

whether such cattle are not of themselves a direct loss, yielding less revenue than would offset the cost of their maintenance. If this is the case, as is probably true, it would pay the producer to dispose of tuberculous cattle as soon as possible.

It is well known that herds producing the public milk supply of the present day are to a serious extent infected with this disease.

It would seem, in a matter so closely involving the health of the people, legislation might be agreed upon everywhere rendering the tuberculin test obligatory, killing such cattle as react, and giving a fair recompense to the producer for his immediate pecuniary loss.

BOARD OF HEALTH OF BRAZIL.* To many Americans the words "South American Republic" and "Revolution" have become almost synonymous, and the thought is often expressed that in these countries human life is held quite cheaply. Dr. Nicholas Senn of Chicago, in an interesting article in the October 19 issue of the Journal of the American Medical Association, on the "Work of the National Board of Health of the Republic of Brazil," presents in a most interesting manner the great work which is being done for the saving of human life in that country under the leadership of Dr. Oswaldo Cruz, Director General of Public Health:

"At the head of a sanitary corps of 2,200 well-trained and well-equipped men, and with the aid of a large staff of assistants specially trained for their work, he has succeeded in ridding the Brazilian coast of yellow fever and reducing the ravages of bubonic plague to a minimum. These two diseases for years and years have decimated the population of Brazil, clogged the wheels of commerce and seriously impeded the development of her boundless resources. None

* A. M. A. Journal, Oct. 19, 1907

of the many whom the Brazilians have honored by the erection of monuments and statues has done so much for the country as Dr. Cruz. He has undertaken the difficult task of fighting yellow fever and bubonic plague fearlessly and with a firm conviction that victory would crown his well-laid plans and heroic efforts.

"Dr. Cruz is the dictator of the sanitary department of the federal government. His word is law and his requests are never pigeonholed, as is only too often the case in sanitary matters in our country, from the general government down to the administration of the smallest of villages."

The work done in the Brazilian laboratories, according to Dr. Senn's description, is up to date in every detail. "The assistants, ten in number, are all young men who are well qualified for their work and who are anxious to be a credit to their master. Each one has his special work assigned to him by the director.

"Dr. Cruz receives an annual salary of $6,000 in gold, an insignificant sum considering the value of his inestimable services.

"The first two assistants receive a salary of $300 a month and the others $250 each.

"Bacteriologic, pathologic and research work and the production of prophylactic and curative sera take up the time and attention of the chief and his assistants."

A revolution or two in some of our own states might be welcomed if as a result the public health service should be organized on so admirable and progressive a basis as is that of Brazil.

BOOK REVIEWS

Report of the Storrs Agricultural Station, 1906. "*Classification of Dairy Bacteria.*"

This contribution appears in the "Report of the Storrs (Connecticut) Agricultural Station for 1906." The work was carried out in the laboratories of Wesleyan University under H. W. Conn and W. M. Esten, and in the laboratory at Storrs under W. A. Stocking. For the writing, the arrangement of the scheme of classification, and the grouping of micro-organisms, H. W. Conn assumes responsibility.

What value attaches to a classification of this nature has been and will be repeatedly asked. Especially is this true at this stage of our bacterial growth or development, which pertains to systematic or comprehensive arrangement of micro-organisms. These questions usually come from those not familiar with this branch of science or the fundamental character of the studies. Fortunately and unfortunately bacteriological results have been measured by the "yard-stick" of "practical usefulness" to the layman who may not fully appreciate that the bacteriologist also seeks investigations and studies of "practical usefulness" with which the layman may not be acquainted, and which are essential to work having immediate application to dairy practices. Such work stands to the bacteriologist as a vital part of procedure or accomplishment.

To the bacteriologist the work is pregnant with possibilities, and is so presented that its usefulness in bacteriological scientific studies, while it may be lacking in much, will be immediately apparent. No worker who has experienced the chaos in this field of investigation can fail to understand its significance, for it will not only reduce the amount of ambiguity existing, but will clear away the mist enshrouding many

descriptions, and will diminish the number of dairy micro-organisms launched as distinct species, new species, or varieties, but its greatest influence will be felt upon future work by creating an exacting spirit, when a micro-organism is to be treated as a known species or is to be presented as a *débutante.* It will call to line. It will aid materially by its uplifting tendencies.

It matters little whether in many of its details it will provoke harmony or discord; one result is assured, it will provoke a spirit which will work for good. Its importance lies in its inception and direction.

Any review of this contribution would fail or fall short without the words of the author as a preface: "The previous paper (referring to the description of dairy bacteria, by H. W. Conn in 1899) has served a purpose. It was recognized when it was published that it was only a temporary expedient, designed as a stepping stone towards something better. It is hoped that the present may serve a better purpose in the same direction and bring us nearer to a clear, satisfactory classification of dairy bacteria." This statement precludes criticism of a destructive character, but makes possible suggestion for future undertakings along these lines. Evidently the authors have in mind systematizing, grouping and identifying dairy bacteria. Does the scheme presented accomplish any one or all of these, considered in the light of available knowledge?

The method pursued in classifying is not generally accepted in various quarters, although it has been subjected to various modifications for one purpose and another in the hands of different authors. Probably no other classification would be as acceptable to the greater number of bacteriologists as Migula's. In selecting this system the authors were safe, because of some of the durable and elastic features embodied in it; and yet whether the specific micro-organisms of lactic fermentation are rods or spheres and like questions

may cause confusion with some who would seek mathematical precision in nature's biological form.

When the authors attempt to group, the difficulties multiply rapidly; for is it not true that when an effort is made to draw a sharp line between liquefaction and non-liquefaction of gelatin in some instances, the task resolves itself into a state of mind that is strongest by being silent? To circumvent this danger the authors have resorted to a double placing, therefore practically leaving the disputed question open. The same troubles are found in the consideration of "No Acidity in Dextrose," and "Acid in Dextrose." Is it not somewhat contradictory to find a subheading "No Acid in Dextrose" (page 188) under a grouping "Acid in Dextrose"? By reviewing page 115, the authors' interpretation will be readily understood. Any attempted grouping would meet with the same or similar obstacles. Other seeming incongruities in grouping may be found readily, but first, critics should make an investigation of the reasons leading to them, then devise some means by which they may be eliminated with the insufficient usable knowledge.

It will be for the work of the future to determine whether the factors employed to group will be satisfactory and stable. At the present time many notions prevail, and it is just as well that this plan of grouping be presented as any other, inasmuch as all are subject to unconquerable ignorance. The method used in this contribution is very simple and as sharply defined as any would likely be.

To identify means to permanently establish the life history of an organism, and, in a way, to standardize it. If this is successfully accomplished, the normal life of the organism should be known along with all its variations which are produced by what may be regarded as abnormal influences and conditions; in other words, no fact bearing upon the identity may be safely disregarded.

The authors have selected those morphological and cultural phases which have come to be considered as essential to the study of every bacterial form, notwithstanding the possible variations to which they are subject; and they recognize in them the crucial tests of identification. Other important phases they have eliminated as "confusing and unnecessary," and many descriptions as "verbose." This is playing a bold hand; for is it not true that each year is bringing about added crystallization of ideas from contributed facts? Are bacteriologists not gaining in their knowledge of species and variations by the accumulation of perhaps confusing data? Is it to be the policy of bacteriologists or their tendency to eliminate many phases of the life history of an organism or such physiological studies lest they may not be of use in identification? Or will it become bacteriological investigators to proceed along the line of exhaustive study in the hope that any facts will be useful in identification as well as for the solution of some special problems in mind? While many available facts may not be required to establish a certain system of classification, it would seem that any system of classification would be faulty in so far as it cannot satisfactorily utilize the known facts. When the authors say, "But the value of the descriptions in earlier literature varies with the completeness of the description, and the majority of these earlier described bacteria are so meager that they are absolutely worthless," then further say, "In our recent work we have tried to include in our technical routine of description all of the characteristics usually adopted for the general description of bacteria. We have, however, not adopted the practice of determining the formation of indol or the reduction of nitrates," is it not possible that the authors forget that their reviews and their present acts of identifying characters fall into the same category — both are very meager and unsatisfactory at best? It is an evolutionary process.

It is exceedingly difficult to define what characters are the leading, the important, the essential in identification or even grouping, as is often demonstrated when several competent bacteriologists work out the life history of the *same* micro-organism. While realizing the full value of most descriptions of bacteria appearing in print, there is a disposition on the part of bacteriological systematists to overlook the fact that identification as such is not intended, but rather a simple comparative differentiation for some definite object in which the investigator is interested. To identify satisfactorily is at present in a large degree beyond the power of the bacteriologist; to tentatively place seems his limitation. This should be deplored, yet it is required.

To illustrate how precarious is identification it is only necessary to refer to pages 99 to 101, upon which are set forth the inadequacy of our knowledge and the instability of the cultural characters employed. Again, such a factor as milk digestion was made dependent upon mere eye examination; the determination of aerobiosis and anaerobiosis was confined to the closed end of fermentation tubes and the mica plate method; the possible variations in milk are disregarded; the reaction of potatoes employed in the descriptions does not receive attention; and other inexact procedures are noticeable. These possible variations in procedure, together with the possible variations of the micro-organisms due to temperature conditions, artificial media, et cetera, render absolute identification almost impossible.

In the matter of nomenclature it is a very doubtful practice to insert "lactis" in the name, unless it can be demonstrated that the micro-organism is strictly peculiar to milk, or at least is especially favored in its development by milk as a nutrient medium. It is very uncertain whether many of the organisms described could be thus assigned.

Going back to the purpose of the authors as stated by themselves, the object in mind has been accomplished ad-

mirably. They deserve unstinted gratitude. They have provided a good working classification, they have suggested a grouping which may stand the tests of time, and they have provided an excellent foundation for identification. The work is mainly fundamental.

CHARLES E. MARSHALL.

Sanitation in Daily Life. By ELLEN H. RICHARDS, *Instructor in Sanitary Chemistry, Massachusetts Institute of Technology. Whitcomb & Barrows, 30 Huntington Avenue, Boston, Mass. Price, 60 cents.*

In this new book Mrs. Richards again emphasizes her principle of inculcating upon growing persons the necessity of forming sanitary habits and following sanitary rules. She mentions especially the specific subjects of the clean city, the clean house, habits of cleanliness and sanitary regulations with their various sub-topics, but in a very brief way. The book is merely a collection of rules, with experiments at the end of each chapter to show the importance of these. It seems to be written for teachers, and yet at times the child is directly addressed. This fact, with the frequent repetitions, makes the whole rather inconsistent and almost unsatisfactory, as it is too far advanced for the child and too simple for the instructor.

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BOOKS AND PAMPHLETS RECEIVED.

Five Hundred Surgical Suggestions. Practical Brevities in Surgical Diagnosis and Treatment. By WALTER M. BRICKNER, B.S., M.D., *Chief of Surgical Department, Mount Sinai Hospital Dispensary, New York; Editor-in-Chief, American Journal of Surgery; and* ELI MOSCHCOWITZ, A.B., M.D., *Assistant Physician, Mount Sinai Hospital Dispensary, New York; Associate Editor, American Journal of Surgery. Second Series.* 125 *pages. New York: Surgery Publishing Co.*, 92 *William Street*, 1907. *Price*, $1.00.

Diseases of the Rectum. By W. C. BRINKERHOFF, M.D. *Chicago: Orban Publishing Co.*, 1907. *Price*, $2.00.

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